THE RUBBER AGE

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COVERS ALL PHASES OF THE PRODUCTION AND MARKETING OF CRUDE RUBBER AND THE MANUFACTURE AND DISTRIBUTION OF RUBBER GOODS

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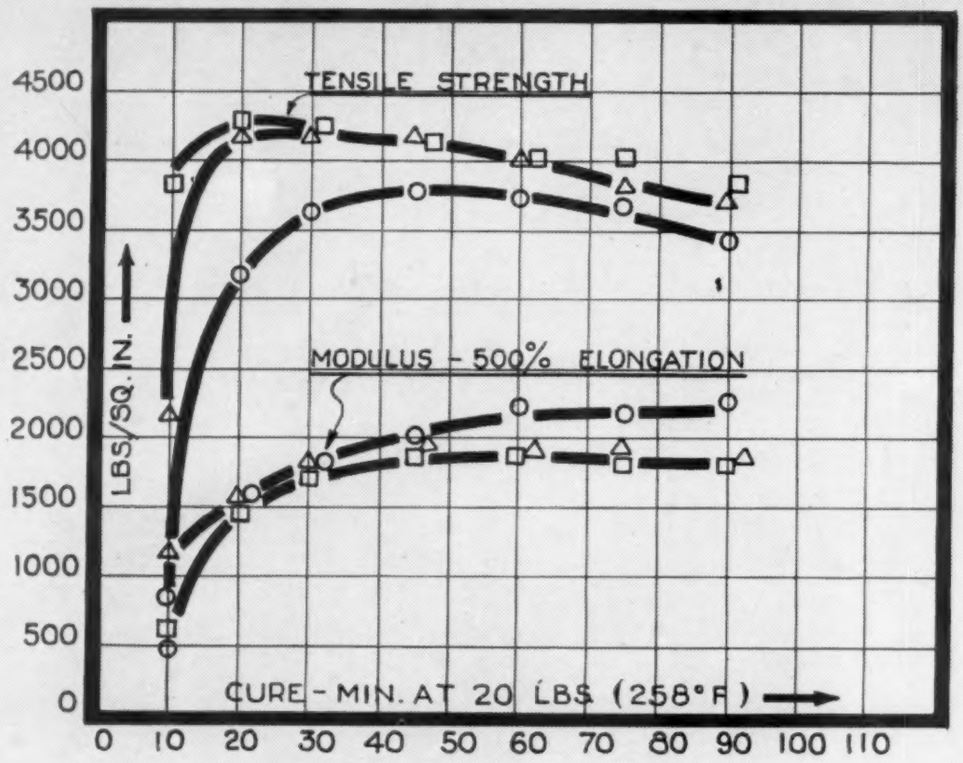
STEARIC ACID	3
ZINC OXIDE	100



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Synthetic Resins and the Rubber Industry

By Harold F. Wakefield
Bakelite Corporation, Bloomfield, N. J.

SINCE their introduction the phenol-formaldehyde plastics have had certain interesting points of contact with the rubber industry. The rubber field being the older, it has often seemed that synthetic resin plastic was crowding rubber plastic in its own field. A closer examination shows the struggle in a somewhat different aspect. The story of the contacts between the two seems to parallel in many ways the ordinary course of human relationships which so often have three stages of development: first, a period of acquaintance and competition; second, a period of occasional mutual assistance; and finally, a friendly period in which each may learn and even borrow from the other.

Instances may be found which typify each of these three stages. Originally the phenol resins were challengers and competitors of hard rubber or ebonite. Then we began to find cases in which the two materials were used together; either in composite structures, each retaining its physical identity, or in apparently homogeneous mixtures in which the combined properties gave some desired effect. These could involve either hard or soft rubber, the phenol resin usually being hard. The example of the third stage of cooperation is primarily concerned with the soft or flexible coatings. The reasons for the respective victories or defeats and the properties involved in the cases of cooperation may illuminate somewhat the fundamental nature of the two materials. This story properly begins with the introduction of phenol resinoid plastics during the years between 1909 and 1915.

It may be interesting to recall that they were first offered to the hard rubber molders. In that day the apparatus in common use in the hard rubber industry was not designed to obtain the best results from phenolic plastics. The molds were rather crude, a long curing cycle was required and usually only forty pounds of steam were available for cure. The presses were huge and cumbersome with lower molding pressures than those required for the phenol plastic then available. An even greater obstacle was the tendency of the men in the older industry to be secretive in the way the workers in any field always have been before emerging from the rule of thumb and secret formula stage.

At present we have our chemical societies, technical groups and round tables with more opportunity for free interchange of information and greater receptivity to new ideas. At all events, the rubber molders hesitated to change their procedures to meet the conditions of a new plastic of whose future value and importance they might well be skeptical. The salesmen and engineers who were marketing the newcomer were not welcomed and little help was extended to them.

It is a singular fact in the history of new ideas and new materials that it is almost never the logical person who is the first to take up an innovation. The phenol plastics were refused with equal enthusiasm by the shellac molders who might have been, with equal logic, the godfathers of the new industrial infant.

This paper is based on talks given by the author at recent meetings of the Chicago and Boston Rubber Groups.

The eventual channels through which the phenol resins obtained their start were in the plants of the consumer molder, although historically the first piece was molded by the Boonton Rubber Company. Another rather curious angle in this history goes deep into the psychology of conservative resistance to change. In few instances were the large well established companies in an industry the first to adopt a phenolic plastic part; generally it was some small independent whom the large companies considered an outlaw. Often only a few years were required before the large companies were making the same change. As a matter of fact, the small competitor with less at stake may well be used by society as the first testing ground of a new commodity.

Probably the first major struggle for a common market was for the gasoline engine distributor head previously made from hard rubber. The phenol plastics now comprise the major share of this product. Hard rubber required about twenty minutes to mold with some subsequent machining and fitting of metal inserts. Further, it had a somewhat uncertain shrinkage. The phenol plastic, after only a ten minute molding cycle, came from the mold requiring little finishing and having the metal inserts molded in place. It had small shrinkage and retained its dimensions and its appearance under service conditions. The phenol plastic had one serious fault in its inferior resistance to carbonization under an arc or spark. This gave rise to one of the first composite structures employing both rubber and phenol resin plastics, in which a hard rubber track was molded into the head for the wiping contact[1]. The first real impetus to their wider use for this part came when Remy Electric introduced the jump spark head which required no rubber track.

The phenol plastics have been greatly improved in their arc resistance but even today, in cases where a magneto is used and hotter sparks are encountered, the rubber head is still commonly employed. This is particularly true in airplane motors.

The second major conflict came in the telephone industry for application in mouthpieces and receivers which had all been made from hard rubber. The phenol plastics replaced rubber for several reasons:

(a) Convenience and economy in molding and finishing. The phenol plastics came finished from the mold after a five or ten minute curing cycle. Hard rubber required thirty minutes in the mold and the pieces then had to be finished.

(b) Ability to mold inserts accurately in place.

(c) Superior appearance after long service.

(d) The lowering of surface electrical resistance of rubber upon aging. It is well known that the surface resistivity of hard rubber drops on aging, particularly in sunlight. This has been ascribed[2] to the formation of a film of sulfuric acid.

The third large scale competition was for the newly arrived radio market. The large volume business was for the panels, of which each set used several pounds. This market is no longer important, but while it lasted, the phenolic laminated sheet captured almost the entire field, rubber being limited in general to the over-the-counter part business for home-made sets. Rubber was much easier for the home mechanic to cut and drill, but the large manufacturers could handle the laminated phenolic sheets in their special machines and the panels were more resistant to distortion and cold flow.

This material, prepared by Synthane Corp., consists of layers of soft rubber "sandwiched" between sheets of Bakelite Laminated.

Competition in the Abrasive Field

Today other contests are in progress. One of the most interesting is in the abrasive field. Rubber bonded snagging wheels for smoothing out steel billets preparatory to rolling had taken much of the business away from the vitrified wheels, for one could obtain a more satisfactory surface with fewer scratches. At present resin bonded wheels compete directly with the rubber wheels and the market is yet divided. Either rubber or shellac was used to bond the marble cutting or copying wheels. New resin bonded wheels compete directly and have a considerable share of the total business. For cut-off wheels, resin has largely replaced rubber as a bond except for very thin wheels, in which rubber has an advantage because the rubber-abrasive mass may be sheeted on rolls and blanked out in pieces.

Rubber wheels are quite satisfactory for wet grinding, and the rubber chemist may be pleased to know that most of the wet grinding of cast phenolic resins for the jewelry and button trade has been performed with rubber bonded wheels. In operations where grinding and polishing are desirable in one operation a rubber wheel is often preferred, for it burnishes as it grinds. Conversely, when speed and heat resistance are important, wheels bonded with phenolic resins are generally specified. It is my impression that the competition between these two types of bonds for abrasive wheels has been toward extending the total field rather than the curtailing of volume of either.

Some years ago there was a very large use of transparent phenol resin displacing hard rubber for pipe bits. The trend has been back toward hard rubber, in part because of style and in part on account of individual preference for the "feel" and "bite" of rubber. The phenolic resins are, however, still sold in some volume for these mouthpieces, one large use being in a modern corn-cob pipe. Another recently developed pipe comprises a molded phenolic bowl over a replaceable corn-cob liner. A rubber bit is used, making it another case of cooperation between the two materials. In the brush setting field a small percentage of the total has gone to the phenol resins, but it is doubtful if the volume of rubber-set brushes has been impaired. Rather, it seems to me a wider market has been developed. For use as molded wall plugs the phenol resins, to a large extent, displaced both shellac and hard rubber; however, the trend at present seems

to be toward a soft rubber plug. This seems to be one of the fields where the business may alternate between several materials.

At present, phenolic-resin dentures are making an active bid for the rubber denture market and have certain advantages to offer. These are in part esthetic, greater beauty and depth of translucency, a somewhat smoother surface requiring less polishing; and in part sanitary, the resin being unaffected by saliva and presenting a surface offering less opportunity for bacteria to lodge. In the scientific and surgical instrument field the phenol plastics have considerably replaced rubber for virtually the same reason as were found in the telephone industry. We should remember, however, that actually few of the present myriad molded phenolic plastic parts were ever made from hard rubber but, in general, new territory has been invaded.

I have mentioned some instances where rubber was replaced. The story is not at all that one-sided. There have been many cases in which the phenol plastics have made an attempt to invade the hard rubber territory, in which the latter so far retains its advantage. Among these are rubber flooring, bowling balls, battery jars, automobile steering wheels, drug store sundries and toilet seats. There are many other instances that could be found in which either of the two won in fair competition, and others in which the fortunes wavered back and forth. We might better, however, consider a few cases of cooperation between rubber and resin.

It has for some time been possible to mold either hard or soft rubber, side by side with a phenol plastic in a single molding operation, obtaining a perfect bond between the two[3]. The previously mentioned instance of the distributor head with the hard rubber track was one of the earliest examples. Another application comes to mind in which casters[4] were molded with a soft rubber rim and a phenol resin center.

One of the most recent developments of composite structures has been in the so-called "laminated" field, in which a layer or layers of rubber are held between sheets of paper or cloth impregnated with a phenol-aldehyde resinoid. The resinoid may be either hard and stiff or it may be soft and flexible. Such structures are used in applications in which the resiliency of rubber is required along with the mechanical or chemical resistance of the resin; and have shown value in applications where sound-proofness is desired, such as airplane fuselage construction, ship decks and paneling, lunch trays and machine shims.

Rubber-Resin Homogeneous Compositions

In the friction materials field we find one of the best instances of an apparently homogeneous composition with both resin and rubber present. The resin may replace a small amount of the total rubber content, but a superior brake lining results, thereby aiding rubber to hold its position. When first used in this type of structure, it contributed toward better braking under wet conditions and prevented sticking or locking, sometimes called freezing, when a wet brake band was clamped tightly on the steel drum over a period of time. The past tense is used advisedly, for with the modern brake housing the interior seldom gets wet.

While wet brakes are no longer common, higher speeds call for more severe braking conditions with more elevated temperatures. The phenol resins here again play an important part. Their principal value today lies in their intrinsic resistance to decomposition at high temperatures. They also appear to give greater heat resistance to rubber itself, probably by increasing the yield value at these high temperatures. While this effect is noted in structures of a non-fibrous nature, it is even more noticeable and more easily explained in compositions containing fibres such as asbestos.

After being coated with a special flexible Bakelite resinoid, these Revolite fabrics resist oils, common acids, alkalis, etc.

The action of the phenol resin in such a composition seems to be in part one of selective adsorption on the fibres, for one obtains greater ease of milling, mixing and forming, as well as improved water and heat resistance. It would seem that all of these might be ascribed not so much to any intrinsic effect of phenol resin upon rubber itself as to segregation of the resin on the fibres themselves, bonding them together, covering them against water and holding them in position through intense heat. This may in some way be explained by the tendency of resins in general to adhere or stick to inorganic surfaces and for rubber in general to bond with difficulty to other materials. For many years it has been general knowledge that phenol resins, when mixed with rubber, result in greater adhesion to metals. On the other hand, it may well be that the phenol resins have a specific protective effect on rubber as they seem to have on cellulose.

There have been many attempts to use several types of phenolic resins in various rubber compositions. As early as 1902 Luft[5] mentions that rubber may be used to alter the properties of a phenol resin. Between 1910 and 1915 Aylesworth[6] disclosed the use of powdered phenolic resins introduced into rubber compounds. In 1913 Wiechman[7] described various plastic masses containing both rubber and phenolic resins, as did Collardon[8] and also Weckerle[9] some years later. Baekeland[10] found that fusible phenolic resins could be advantageously used in connection with hard rubber and later used rubber in[11] plastics, the flow of which was promoted by aniline. Other inventors[12] recognized the possible use of rubber in modifying the properties of the phenol resinoids. Speedy and Crouch[13] used the fusible and soluble resins in soft flexible rubber. Frood[14] pointed out the value of phenol resins for impregnation of fibres prior to bonding with rubber.

Several investigators have attempted to show, with more or less success and by several methods, how rubber and the resins may best be mixed[15]. There have been many suggestions for fabricated articles for various applications in which one part is rubber and another is some type of phenolic resin[16]. Benjamin[17], working towards a better gasket material, prepared a plastic in which he used phenol-formaldehyde condensation products, rubber, sulfur and a large number of the common fillers.

I have mentioned that the phenol resins confer adhesiveness to certain rubber compositions, and this has been recognized[18] specifically for cases in which latex dispersions are coated on impermeable surfaces. Similar compositions have also been used for treatment of fabrics[19]. Phenolic resin compositions have likewise been used as protective coatings on rubber surfaces[20].

In the *India-Rubber Journal* for 1925[21] a statement was made that for some time liquid phenolic resins had been used in rubber works. The resin was placed in a kneader or mixer and the rubber dissolved in it, presumably the resin being in considerable excess. Some years later Stevens and Stevens[22] presented a rather long article describing in detail the operations and properties of the resulting products when phenol resins were mixed with rubber, equal parts of each being used. They pointed out the harmful effects of excess free phenol and of acid. Their results were not encouraging but they did suggest the use of the resins as tack producers.

The problem of preparing more oil resistant rubber has been well summarized[23] in relation to the effect of adding various synthetic resins. The necessary requirements for oil resistance are (1) reasonable insolubility in oil, (2) reasonable miscibility with rubber and (3) little effect upon speed of vulcanization. Phenolic resins were stated to fail because of their immiscibility and retarding of vulcanization.

It is outside the purpose of this review to give any critical evaluation of the literature. The commercial results which could be directly credited to any of the disclosures mentioned have not been of such importance to be of great interest to rubber technologists, however much they may interest resin chemists.

Mutual Assistance in Printing Plates

One particularly pleasing instance of mutual assistance is found in the development of rubber printing plates. For over eighteen years rubber printing plates have been used in the bag and paper container industry. During the last several years the field has been extended to more accurate and exacting applications. It is generally agreed that without the use of a phenol plastic matrix the rubber plate development would be considerably impeded. Furthermore, for every pound of phenol resin used there will be from four to five pounds of rubber required, one matrix being used to make from four to nine plates.

In the process originally developed the phenol plastic sheets were warmed before pressing and a retaining wall was used to restrain lateral flow. Recently a new matrix sheet has been introduced which requires no restraining wall and which lends itself to a more convenient technique. In this new procedure the zinc plate is heated on the press. The cold plastic sheet is then placed upon it and pressure applied for six to seven minutes at seventy-five pounds steam pressure. No side walls or special precautions are necessary. Slight lateral flow is encountered and shrinkage and distortion are considerably diminished. Matrices may be prepared from electrotypes, line engravings or half tones.

There are other instances in which either the phenol resins or their plastic compounds are used in connection with rubber. In some of these the explanation of the apparently valuable result is not sufficiently well defined scientifically, or else their commercial voume is not important and need not be mentioned here.

We will conclude by describing a development in the

Compatibility of resins and rubber is proven by this rubber base adhesive plaster which has a resinoid waterproof backing.

resin field in which we have borrowed from rubber technology to make a commercially interesting product. This might be regarded with the same interest which we would have if the technologists of the oilcloth or nitrocellulose textile coating industries were to suddenly abandon the use of a dipping tank or spreader knife and the usual solvents and substitute the rubber calender with which to apply their products. While at present this particular material is not the only synthetic semi-resinous material capable of being applied by a calender, it is believed to be the first commercial application. Further, while this particular resin may not itself be the last survivor, it may well be known as the one which was the first to cross that particular industrial bridge.

Since the introduction of this material certain other compounds of a rubbery character, but which are formed by chemical reactions typical of resins, have appeared upon the scene. Some of the glyptals[24] are rubbery and can be adapted to the standard rubber technique. Acrylic resins in some modifications may be rubbery, and though no technique has been described, their properties seem to be such that they could be applied by methods familiar to the rubber industry[25]. Rubber-like materials have been prepared from Cashew Nut Shell Oil[26] which may also, under different conditions, give products which are distinctly resinous.

Conversely, rubber may be treated so that one obtains products which are essentially resinous in character. Such materials as Tornesit, Plioform and Vulcalox cement exemplify these modifications of structure. Likewise, one finds that hard rubber, heated to 260-280° C., changes to a characteristic resin of the thermoplastic type[27].

It is not generally realized that both the heat-reactive resinoids and rubber may approach the phy-

sical characteristics of each other. Rubber, under proper conditions, fulfills most of the essential properties of resins. Except for the fact that rubber has grown into an immense special flexible field of its own, the resin and rubber fields might be classed as a unit. Racked rubber is more nearly like a resin than a rubber, and all high melting resinoids approach a rubber-like condition at higher temperatures. Several years ago[28] in a discussion of these similarities, the comment was made that inasmuch as rubber was brittle and resinous at low temperatures, it might be considered as a fortuitous case of a resin having elastic properties at room temperatures. Whitby[29] has used the term "elasticity temperature" in reference to the temperature above which a brittle material becomes elastic. This term has been employed by Houwink[30] in a recent article, in which he has described some of the mechanical properties of the elastic three-dimensionally polymerized resins. The term "rubber," then, might well refer to a physical condition rather than a chemical formula, and for the convenience of the chemist a new descriptive word might be devised to describe this state.

Calendering a Rubbery Plastic

In calendering a rubbery plastic, or perhaps, what might better be described as a dough-like mass, onto a fabric three properties are of primary significance. They are the cohesion of the mass, the relative adhesiveness to metal and to the fabric, and the mobility or internal friction of the mass. Two physical effects serve to complicate the balance between these three, namely, the influence of temperature variation and the change due to mechanical work. The first three properties are found to be widely different in resins and in rubber. The following table may indicate in a general way the typical differences which we may expect from the two respective physical states referred to the same composition.

	Rubbery State	*Resinous State*
Cohesion	High	Low
Adhesion	Low	High
Internal Friction	Low	High

These are, of course, relative and the temperature coefficients of any property may not be a straight line function. The relationships are far from simple, but we felt that this general picture gave us a basis from which to work. It is hoped that in a later paper the general problem of calendering may be presented in the more exact language of Rheology.

Resins with Rubber-Like Properties

The problem of calendering a resin resolved itself, then, in adjusting a balance between the three properties whereby a commercially practical article could be produced. How this was done is another and even longer story, but is without the scope of this discussion. In short, however, a resin prepared from a modified phenol is reacted in such a way that it has certain rubber-like properties, and this plastic mass may be calendered onto cloth in the same manner as a "skim coat" of rubber[31]. After cure the resulting coated fabric is flexible and waterproof, with certain properties peculiar to the phenol resinoids and dissimilar to fabrics surfaced either with rubber or other types of coating. It is pertinent to the present discussion that this was the first commercially applied waterproofing coating which was found to be compatible with the very sensitive rubber composition of an adhesive plaster or tape, another instance of cooperation. This has made available waterproof adhesive plasters for surgical or industrial use without some of the disadvantages of the older cloth structures. Similar "proofed" fabrics have found commercial use in various industrial and decorative applications[32].

Cooperation Solving Mutual Problems

According to my interpretation of the present trends, the tendency of the rubber, as well as the resin industry, is to make a larger number of compounds with smaller differentiations to meet more highly specialized applications, and I believe that we will find many new instances of mutual assistance in solving these specific problems. I cannot, however, help but wonder what our present situation would be if the rubber industry had, in that early day, adopted the youthful phenol plastics. What other developments would now have been achieved? I believe that we then would have developed a group of men with the technique of the rubber chemist and the facilities of the resin producer, and that such a group would have found infinitely more applications of advantage to both.

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Industrial Rubber Garments

A Review of the Various Types of Wearing Apparel Made from Rubber and Rubberized Fabrics Designed for Industrial Use

FOR many years the importance of safety measures in industrial factories has been stressed by interested organizations, led by the National Safety Council. This importance cannot be over-rated since it involves the health and lives of millions of factory workers and general employes. That the campaigns instituted by various industries have brought results is depicted in the decrease in the accident frequency rates of all-industry from 35 accidents per 1,000,000 man hours worked in 1926 to 15 accidents per 1,000,000 man hours worked in 1934. Safety products made of rubber, especially industrial rubber garments, played an important role in the gradual decrease of industrial accidents, especially in plants where chemicals are handled.

There are many varied styles of industrial rubber garments made by dozens of manufacturers, the diversified line marketed by the Industrial Products Company, 2770 North 8th Street, Philadelphia, being typical of the styles and types available. Engaged in the manufacture of safety equipment of all kinds, this company has kept pace with the development of improved rubber garments, its line ranging from gloves to complete safety suits, merchandised under the Ipco trade name.

Acid-Protective Rubber Suits

For chemical plants, oil refineries, dye factories, steel mills, etc., there is an acid suit to protect the worker from splashes and sprays of heavy acid in inspecting and repairing acid equipment, pipe lines, in cleaning tanks, vats, and for general emergencies. Furnished in a one-piece style, this acid suit is made of double coated rubberized cloth with all seams cemented. It closes by means of a hookless Talon fastener protected by a fly-front which fastens down with snap buttons. Where complete protection from head to foot is called for, there is available an acid hood made of special acid-resistant rubberized cloth. This hood is designed to fit comfortably over the head, neck and shoulders, and is fitted with large laminated glass lens, the entire lens cup being acid-proof. It may be used in conjunction with acid suits, or as a separate head and face protector if desired.

There are other styles of one-and two-piece safety suits, the types featured by Industrial Products being made of "Ute" cloth, a double texture fabric with a solid sheet of rubber vulcanized in between, assuring waterproof qualities. The one-piece suit designed as a wet weather garment is recommended for field workers and has such features as a diagonal hookless fastener covered with a wide protecting flap, a detachable hood, elastic wrist band, protecting shoulder flap, etc. It is easy to clean, an ordinary scrubbing brush and plain, non-alkaline soap and lukewarm water only being required. The two-piece suits, also for field workers, are made of the same "Ute" cloth, and incorporate the features of the one-piece models with some variations. They consist of coat, pants and detachable hood, and are worn over regular clothing.

Double texture fabric with a solid sheet of rubber vulcanized between is also used in the manufacture of industrial raincoats. Olive drab in color, these raincoats will not crack or stiffen in extremely cold weather or stick together when the temperature rises in warmer months. They are generally single-breasted in style, with ball and socket snap fasteners, snap

One-piece garment made from a double texture fabric with a solid sheet of rubber vulcanized in between.

buttons at the wrist for tightening, a corduroy collar with throat latch, slash pockets with inner entrance, and with all seams sewed, cemented and strapped.

Ordinary rubber aprons seldom stand up when used under severe conditions, such as in pickling and galvanizing rooms, soldering, enameling, plating, and other operations. Aprons used in chemical plants, automobile factories, and by workers in storage battery manufacturing plants, are generally made of specially compounded materials to resist the destructive effects of sulfuric and other heavy acids. For use under especially severe conditions, there are now available synthetic rubber aprons which offer protection against all types of petroleum products, alkalis and many chemicals. There is little or no effect on synthetic rubber aprons from hot or cold oils, gasoline, naphtha, hot or cold caustic soda, or tannic, muriatic or hydrochloric acids. These aprons are of the bib style, with four grommets for attaching neck and waist tie strings.

There are several improved types of respirators for general use in factories where workers are faced with the hazards of dusty atmospheres. One such type is a light-weight rubber mask, molded to conform to the shape of the face with snug face contact obtained with little headband tension. Exit of exhaled air in this model is facilitated by an exhaust valve on either side of the mask which closes on the intake. Another improved model is of the bag type, featuring an adjustable rubber face piece. Designed for use where high concentrations of poisonous dust are encountered, the rubber face mask in this model is adjustable to fit all face shapes and sizes by means of bending a wire forming spring. A sealed air passage between the filter bag and rubber face mask makes it impossible for the finest dusts to gain entrance at these points.

Rubber Goggles Have Advantage

Rubber mask type goggles for protecting the eyes, which are comfortable in wear, are available for all-purpose heavy duty work. The rubber edge of the mask readily conforms to the shape of the face, a particular advantage over other models of industrial goggles where dust and splash is encountered. They may be fitted with fine wire screen under ventilating ports for chemical workers handling acids and liquids.

Legging boots and safety work overshoes are two items in the footwear category found in safety use. The boots are designed for use over regular shoes, and fold into a compact wad for convenient carrying. They are usually made of black rubber with net lining, and are provided with strap and buckle at the top for holding in position. Industrial Products features Ipco work overshoes made with Gro-cord soles and heels, with full stretch two-piece net linings, extra stays, one-piece backs and double vamps. They can be worn over heavy work or high top shoes. The Gro-cord sole and heel prevents slipping and provides for long wear. These overshoes come in white.

An interesting rubber safety article is the rubber acid sleeve, manufactured in two lengths, the short length extending slightly above the elbow and curved to keep the sleeve in place, the longer, or shoulder, length having grommets at the top of the sleeves for

Left: Two-piece industrial garment which also is made of double texture fabric with rubber sheet vulcanized in between.

Left: This industrial rubber raincoat is designed to permit wearer free use of hands.

Below: Double coated rubberized cloth is used in both the acid suits and hoods.

tying across the shoulders. These rubber sleeves are seamless, naturally pliable, and find a variety of applications.

Natural and Synthetic Rubber Gloves

No description of industrial rubber garments would be complete without mention of the many styles of natural and synthetic rubber gloves available for every industrial use. The synthetic rubber gloves are seamless, extremely tough and hard to snag. They are especially recommended for cleaning operations and processes where solvents of natural rubber are used. Of the dipped type, they are available in grades ranging from medium to extra heavy. Another type is the white acid glove, built by hand from good quality rubber, with a stockinette lining throughout, suggested for use where mechanical strength is a consideration. There are also rubber-covered canvas gloves, manufactured of canton flannel, chemically treated to insure a proper penetration of the rubber into the weave of the fabric, strengthening both the cloth and the rubber. Vulcanized latex is used in the manufacture of these gloves, which are both flexible and waterproof.

Abrasive helmets, too, make use of rubber, wear from abrasives being reduced to a minimum by the use of rubber electrically deposited on the woven-wire helmet frame, the resiliency thus procured permitting the slight yield necessary to absorb shock. Rubberized straps usually comprise the body harness used to hold these helmets securely in place, simple hook fasteners acting as the securing agents. The

Rubber sleeves of the shoulder length type with grommets at the top of each sleeve for tying across the shoulders.

construction of the helmet proper has the added advantage of minimizing the sound caused by contact of flying abrasives. All parts of the helmet are so constructed that no part touches the operator's head while in use.

There are many other items made of rubber which guard the lives and health of the industrial workers, all of which contribute somewhat to the campaign for lowering accident frequency rates in all industries. The several described here, however, indicate the variety of the industrial rubber garments utilized in safety precautions.

The German Rubber Industry

DURING the year of 1935, the keynote of the German Government's program was the conservation of rubber supplies in every way possible and to reduce imports. While crude rubber imports remained at about the same figure as the previous year, despite the pressure put behind synthetic rubber production, the importation of finished rubber goods declined, thus indicating greater supplies from the local industry, according to a report issued by the Leather and Rubber Division of the Department of Commerce. Authorities see Germany able to supply increasing demands from its own rubber industry by the increased use of scrap and reclaim without materially increasing crude rubber imports in the current year.

Few industries have felt official Nazi pressure as much as did the rubber industry in 1935, control of which is vested in the Foreign Exchange Control Board for Rubber, through the Price Fixing Control Board, and through the Rubber Industry Economic Board. The industry used about 65,135 metric tons of imported crude rubber as compared with 63,661 metric tons in 1934. About half of this amount was absorbed by the tire manufacturers. In November, 1935, the government placed an embargo on all scrap exports, including rubber, which means no scrap rubber will be shipped out of Germany this year, indicating a greater use for it in the country. Raw rubber importers are quoted to the effect that Germany can supply itself with about 24,000 metric tons of reclaim annually.

During 1935 the government also laid down stringent rules for standards in the tire industry, limiting manufacture to certain sizes and allowing the use of black only for casings and grey for inner tubes. This color standardization was also placed on other rubber products, including footwear, black being the only color permitted. The government, earlier in the year, had drawn a distinction between "necessary goods" and "luxus articles," brown and other colors in rubber footwear being considered among the "luxus articles" and therefore forbidden.

Government Restrictions Hinder Trade

Imports of finished rubber products declined materially during the year, not only because of increased production of similar articles in Germany, but because of the difficulty of making purchases with marks due to government restrictions, the barter system of trading being found generally unsatisfactory, especially with the United States, according to Assistant Trade Commissioner Rolland Welch, in Berlin, except in cases involving raw materials.

Statistics with regard to the German tire industry recently made available reveal that domestic production of the 19 factories engaged in producing tires in 1934 was valued at 141,500,000 marks (the mark is worth approximately 40¼ cents at the current rate of exchange) which compares with production valued at 102,800,000 marks by 17 factories in the previous year. Over 60% of tires and tubes manufactured in Germany are produced by factories located in the Province of Hanover. The use of German-made tires as original equipment on almost all cars assembled in the country is one of the major factors in the improvement of the tire industry, according to American Vice Consul W. C. Affeld, Jr., stationed at Bremen.

Goodyear's "Gum Elastic"

In His Previous Article the Author Told of Examining Both a Paper and Rubber Edition of This Historic Book; He Now Makes Some Interesting Observations Based on a Closer Examination of Both Editions and Also Makes Mention of Goodyear's Manuscript Notebook

No. 2 of a Series

By P. W. Barker

COPIES of Charles Goodyear's "Gum-Elastic" available in Washington, D. C., the paper copy in the Library of Congress and the rubber copy in the Smithsonian Institution, were subjected to further examination.

Reproduced here is a picture of the rubber copy with its beautiful hard rubber front cover. The back cover of this volume also has a hard rubber panel of plain design inset in its face and not a metal panel as was first supposed. A second reproduction is of the manuscript notebook which Charles Goodyear used in preparing "Gum-Elastic" for publication, opened at a double page showing ink descriptions and pencil drawings of umbrellas.

Reproduced above is the hard rubber front cover of the extremely rare full rubber copy of Goodyear's "Gum Elastic," dated 1855. The back cover of this volume also has a hard rubber panel of plain design. Photo, courtesy of U. S. National Museum.

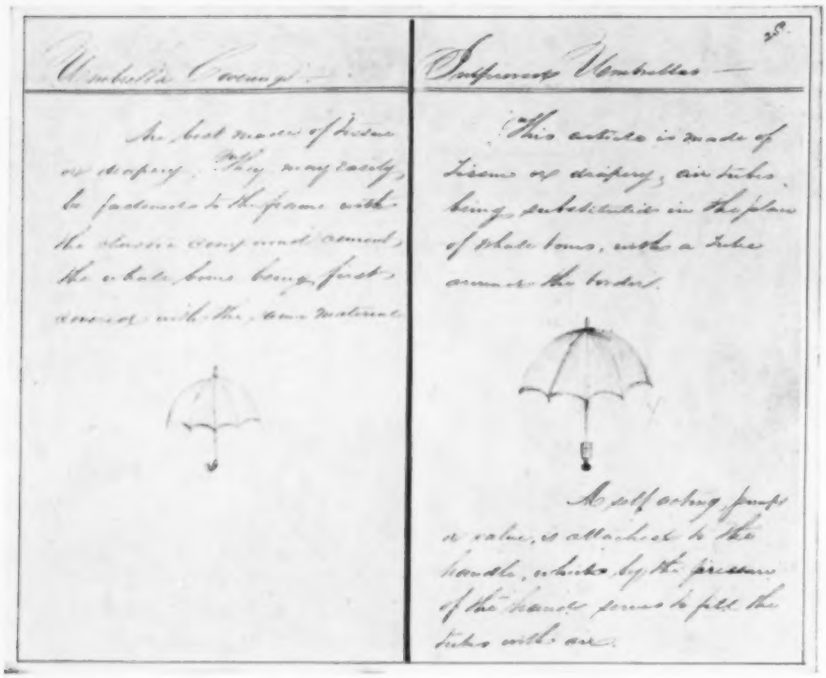
This manuscript notebook is extremely interesting and, from notes appearing in it, was written about 1846. Goodyear's manuscript tells the purpose of his writing "Gum-Elastic" in the following language, language which is so characteristic of him, mild and almost self-effacing in nature:

> "I have neither thought of placing the thoughts expressed in the few preceding pages before the public or of writing what follows and arranging it in the form of a book upon this subject until I was induced by the pressing solicitations of some scientific gentlemen who insisted upon my pursuing this course in order to preserve for the benefit of others such information as I might possess upon the subject. My acquaintance with Gum-Elastic and knowledge of its adaptations to various purposes and new inventions growing out of the discovery had put me, as they said (and I am not disposed to differ), in possession of much information valuable to the public which would otherwise be lost, in the event of my death. I have yielded to the measure, endeavoring to confine myself to facts that I know by experience, avoiding speculative or uncertain applications, of which I might have enumerated many more."

Goodyear's manuscript has a pencil drawing from which the artist obtained his conception of the native rubber-gathering scene of the cover to the rubber book. Like so many educated persons of over 75 years ago, Charles Goodyear was a good penman and fair at drawing. Liberal use by the artist of foliage has assisted greatly in conveying a much better idea of the Amazon jungle than was given in Goodyear's simple drawing. Instructions to the artist, in Goodyear's manuscript, were:

> "Method of Gathering the Gum—
> The drawing represents an Indian camp on the River Para, a branch of the Amazon, from which place most of the gum has heretofore been imported to the United States. No. 1 in the cut—Indian Tapping the Tree; No. 2—Attaching the Clay Cup; No. 3—Pouring the Gum Upon Lasts, of Clay; No. 4—Smoking the Shoes or Bottles. It is gathered by scarring the tree and attaching to it a small clay cup very much resembling a mud swallow's nest. From these cups are emptied about a gill of sap every morning, and other cups attached to the tree. From the camp the gum is sent in boats to the city of Para, from which place it is shipped to different countries."

Umbrellas, after life-saving devices, were upper-



Reproduction of a double page opening in the manuscript notebook used by Charles Goodyear in preparing "Gum Elastic" for publication. His inventive mind is indicated by the umbrella drawings in this reproduction. Photo, courtesy of U. S. National Museum.

most in the mind of Charles Goodyear as applications for his vulcanized rubber. Examination of the paper copy of "Gum-Elastic" in the Library of Congress, under Chapter XXIV—*Miscellaneous*, Volume II, page 276, reveals the following words of Goodyear concerning umbrellas:—"If there is any one purpose to which gum-elastic is adapted without objection, it is doubtless that of umbrellas." On the next page, 277, appears definite evidence that the manuscript notes were the source from which "Gum-Elastic" was prepared:

> "PARASOLS:—The parasol or shade, which is made without a frame, to be inflated with air through a caoutchouc ivory handle, with a valve at the end of the handle, is noticed simply as a curiosity, without any pretentions as to its practical utility."

Considerable controversy has raged as to which is the first edition of Goodyear's "Gum-Elastic," the paper copy or the copy printed on rubberized fabric and bound in rubberized fabric with beautiful hard rubber covers. There is little doubt in the mind of the writer but that the paper copies dated 1853 are of the first edition. The rubber copy in the Smithsonian Institution has a small notation inside its front cover printed on a slip of paper which disposes of all conjecture:

> "These volumes are incomplete and are not intended to be issued to the public before being revised and enlarged, which the author hopes ere long to do.
> "Several chapters are left unfinished, and correct references to the plates is not made, a small portion of which only are executed."

"Gum-Elastic" was reprinted in 1855 from the same type as the 1853 first edition, it is believed, with only the change of date on the title pages, and some of this second edition was printed on rubber. The *India-Rubber Journal* states that no copy of the 1853 edition nor of the rubber copy is in all England, but that copies (4 in all) of the 1855 second edition are in the British Museum, the British Patent Office, Birmingham Corporation Libraries, and the Library of the North British Rubber Company. It is the Birmingham Corporations Library's copy which the English journal is reproducing in facsimile at the present time.

The United States, naturally, would be richer in copies of "Gum-Elastic" than England or any other foreign country. Copies of the 1853 edition appear in the Los Angeles Public Library (gift of Henry C. Pearson, former publisher and editor of the *India Rubber World*), the Public Library of the City of Boston, and the Library of Congress, in Washington. The New York Public Library has a copy of this book, Vol. I of which is dated 1855 and Vol. II is dated 1853. Yale University, at New Haven, Connecticut, once the residence of Charles Goodyear and the place of publication of these rare editions, has a paper copy, both volumes of which are dated 1855. Another copy, both volumes 1855, is owned privately by David Spence, who has done so much for the production of rubber from guayule, at Carmel, California.

One of the most interesting copies of Goodyear's book is in the Library of Harvard University, at Cambridge, Massachusetts. Volume I of this copy is 1855 and Vol. II is 1853. This copy is bound in full green morocco and it is inscribed to "James A. Dorr from Charles Goodyear, October 23rd, 1858." It was given to Harvard University by Mr. Dorr in 1869. Mr. Dorr is mentioned by Charles Goodyear in "Gum-Elastic" on page 41 of Vol. II as the person who suggested to him the application of hard rubber for the manufacture of pens.

And to complete the record, there is the full rubber copy in the Smithsonian Institution, dated 1855. Inquiries have been made at Akron, Ohio, but there does not appear to be a copy of "Gum-Elastic" by Charles Goodyear in that city which perhaps owes its reputation as the leading rubber manufacturing city in the world to the discovery of vulcanization.

Crude Rubber Report

THE Crude Rubber Committee was appointed by Chairman Cadwell at the regular meeting of the Division of Rubber Chemistry in New York, N. Y., on April 23, 1935. After one meeting in New York, and two in Akron, the committee presented a preliminary report to the Division of Rubber Chemistry at the Akron meeting on October 1, 1935. In this first report,* the functions of the committee were defined and a list of foreign contacts reviewed. In addition, a tentative formula for testing crude rubber was presented. This formula, however, was not published in the literature, as the committee felt that additional work on it was necessary.

The committee had planned to hold at least two meetings before the meeting of the division in Kansas City, but owing to circumstances beyond its control, it was possible to hold only one meeting. This was held in Akron on March 30. A great deal of information, however, has been exchanged by correspondence, and as a result, the committee agreed at its meeting in Akron on March 30 to make certain definite prosposals to the division.

Since the Akron meeting of the division, contacts have been made with additional technical organizations on the producing side of the crude rubber industry, and in all cases, the committee has met with a spirit of complete cooperation. Numerous letters and reports have been received from these various organizations.

Particular attention should be called to the efforts of the Rubber Research Institute (and the London Advisory Committee) and to a group in the Dutch East Indies. Edgar Rhodes, of the Rubber Research Institute, since his return to England and later to the Far East, has been particularly active in acquainting the producers with the problems confronting the consumers. We have learned of Dr. Rhodes' efforts not only through the publication of his papers in the trade journals, but also through correspondence and discussions with other individuals in the producers' technical organizations.

Processing Difficulties with Sheets

The committee has just received a communication from the Rubber Research Institute, in which it is stated that various English consumers have complained about processing difficulties with certain light-colored smoked sheet that is beginning to appear on the market. This sheet is made in a new more efficient type of smokehouse, and is to be distinguished from the Socfin type in that the smoking is done in a house in which the smoke is carried to the rubber through an underground flue. Some of the smoke bodies are condensed out in the flue, and an amber-colored sheet results instead of the darker sheet. In the Scofin type, the preparation involves rapid drying in hot-air chambers, where the heat is supplied by steam pipes.

Dr. Rhodes would like to know whether American consumers have noted any serious difference between light- and dark-colored smoked sheet as far as processing is concerned. Other than processing, is there any preference between light and dark smoked sheet? Particular attention is called to the fact that this question refers only to differences between light and dark standard Smoked Sheet No. 1. The Socfin type of rubber is not involved. The committee would appreciate it if various members of the division would submit any data that may be available. Expressions of opinion are not acceptable, as only accurate information is to be sent to the Rubber Research Institute. Any comments should be sent to the chairman of the committee. The committee members will check this item in their own laboratories.

Dutch Organize Cooperating Committee

The committee is pleased to announce that it is in receipt of a communication signed by L. R. van Dillen of the A.V.R.O.S. Proefstation, who is writing in the capacity of secretary of a Crude Rubber Committee which has just been set up in the Dutch East Indies. This committee has been formed with the express purpose of cooperating with the Crude Rubber Committee of the Division of Rubber Chemistry of the American Chemical Society in order to promote better understanding between consumers and producers. The personnel of the Dutch East Indies committee is as follows: W. T. L. ten Broeck, the Goodyear Rubber Plantations Co.; W. E. Cake, Hollandsch-Amerikaansche Plantage Mij.; L. R. van Dillen, A.V.R.O.S. Proefstation, secretary; Th. G. E. Hoedt, West-Java Proefstation; H. van der Meyden, Rubber Cultuur Mij. Amsterdam, chairman.

In the report to the division at Akron, the committee discussed a crude rubber testing receipe but did not make it a part of the formal report. This recipe is now presented as follows:

Tentative Standard Testing Recipe

(Variability in curing properties)

Rubber	100.0
Zinc oxide	6.0
Sulfur	3.5
Stearic acid	0.5
Mercaptobenzothiazole	0.5

Cure: 20, 30, 40, 60, 80 minutes at 260° F.

The testing procedure to be followed is that outlined by the American Society for Testing Materials, Committee D-11 (on rubber products). Tensile at break, elongation, and modulus at 500, 600, and 700 per cent may be reported. The committee requests that this procedure be checked through the various laboratories and criticisms submitted to the committee. This same request was made at the division meeting in Akron in October, 1935, but to date no comments have been received from the members of the division. As a result, the committee feels that the members do not disagree with the formula as presented and that it is, therefore, acceptable for publication.

In all probability, it will not be necessary to run

This report was presented at the Rubber Division, A.C.S., meeting, Kansas City, April 16, 1936, and is reprinted from the June 10, 1936, News Edition, *J.I.E.C.*

* See THE RUBBER AGE, October, 1935.

all of the cures for control purposes. The numbers of cures run by any given laboratory will depend upon individual preference. The committee will be pleased to receive recommendations from various organizations regarding limitations on the number of cures. Since it is obvious that if sufficient information for control purposes can be obtained by running only part of the cures, it is a waste of time and money to run the entire series.

A table accompanies this report showing data on 32 different lots of No. 1 ribbed smoked sheets run according to the above specifications. A study of this table indicates very clearly large differences in crude rubber as far as curing properties are concerned. The lots in the table are arranged in order of modulus at 600 per cent on the 40 minutes at 260° cure for convenience. The committee has available a large amount of additional data on the proposed recipe, as well as on various other recipes, but it has been decided that publication should be limited to that information included in the following tables.

NO. 1 RIBBED SMOKED SHEETS TESTED IN CRUDE RUBBER COMMITTEE'S TENTATIVE RECIPE

Arranged in Order of Modulus at 600% on the 40 minutes at 260° Cure

	20 Minutes at 260° F.				
Sample	T. S.[a]	Elong.	500[b]	600[c]	700[d]
58	150	900	Not recorded		
50	500	1000	Not recorded		
52	500	975	Not recorded		
60	700	1060	Not recorded		
48	1600	940	175	300	500
49	1925	900	200	350	650
61	1750	960	200	325	525
39	2200	985	200	375	700
46	1850	900	200	400	750
37	2300	920	250	400	775
63	2000	900	250	450	800
38	2500	930	225	400	825
55	2000	900	250	400	800
69	1750	850	300	500	925
64	2300	930	250	475	900
70	1800	880	225	400	800
47	2300	900	250	475	100
44	2400	890	300	450	700
68	2300	860	325	625	1200
51	2600	870	300	575	1125
59	2075	880	300	475	900
43	2700	965	350	675	1300
57	2100	875	300	525	975
56	2550	860	375	700	1350
66	2450	875	250	500	1000
45	2450	865	375	650	1175
54	2450	835	375	700	1300
62	2475	820	425	850	1475
65	2750	800	425	900	1650
27	2875	805	475	900	1750
53	3200	855	400	800	1525
67	2650	835	400	800	1400
Average	2060	895			

	30 Minutes at 260° F.				
Sample	T. S.[a]	Elong.	500[b]	600[c]	700[d]
58	1500	925	150	300	500
50	1675	935	200	325	525
52	1700	930	150	300	500
60	2000	925	250	400	700
48	2100	900	300	500	900
49	2400	910	300	500	950
61	2550	900	300	500	900
39	2500	890	300	550	1000
46	2700	895	300	550	1100
37	3000	895	300	425	1200
63	2400	885	350	600	1100
38	2850	865	325	600	1275
55	2550	875	325	650	1250
69	2175	870	300	500	1025
64	2450	840	375	650	1275
70	2175	810	325	600	1175
47	2875	880	300	600	1225
44	2600	870	375	625	1200
68	2600	830	400	800	1425
51	3100	845	375	725	1450
59	2650	845	400	750	1400
43	3150	840	400	800	1500
57	2575	810	425	825	1550
56	3050	815	450	900	1750
66	2950	800	400	875	1725
45	3100	845	500	925	1675
54	2925	800	500	1025	1850
62	2525	765	600	1150	1925
65	3025	775	550	1100	2050
27	3150	795	550	1075	2050
53	3500	825	475	1000	1975
67	3000	790	600	1150	2000
Average	2620	855	370	700	1315

	40 Minutes at 260° F.				
Sample	T. S.[a]	Elong.	500[b]	600[c]	700[d]
58	1850	915	200	350	675
50	1800	875	300	425	800
52	2000	870	250	425	800
60	2400	880	275	500	1000
48	2450	845	325	600	1200
49	2550	890	325	600	1100
61	2750	855	350	650	1325
39	2750	850	350	650	1275
46	2800	860	325	675	1350
37	2775	845	350	675	1375
63	2600	850	400	700	1300
38	3100	845	350	700	1500
55	2750	825	400	750	1400
69	2450	800	400	775	1500
64	2000	835	450	775	1475
70	2550	810	400	800	1625
47	3200	850	400	800	1500
44	3125	845	425	800	1500
68	2875	810	450	850	1650
51	3250	825	425	850	1650
59	2900	800	500	900	1725
43	3600	840	500	900	1850
57	2575	780	500	950	1725
56	3100	810	500	975	1800
66	3200	785	475	1025	2025
45	3250	820	550	1050	1850
54	3000	800	550	1075	2000
62	3150	790	575	1100	2125
65	3200	765	600	1200	2250
27	3450	790	625	1225	2250
53	3375	770	600	1275	2500
67	3000	750	625	1325	2275
Average	2820	830	435	825	1575

	60 Minutes at 260° F.				
Sample	T. S.[a]	Elong.	500[b]	600[c]	700[d]
58	2550	900	300	500	975
50	2600	865	325	525	1075
52	2500	870	300	500	1000
60	2875	850	400	700	1300
48	2625	825	350	675	1300
49	2650	860	325	600	1275
61	3200	850	400	800	1575
39	3100	840	400	750	1550
46	3300	880	350	750	1550
37	3200	830	400	700	1500
63	3300	850	450	800	1500
38	3550	840	425	875	1775
55	3250	830	425	700	1500
69	2800	785	500	925	1775
64	3000	825	450	825	1700
70	2950	790	500	1000	1925
47	3325	845	425	900	1775
44	3450	830	475	900	1775
68	3100	800	550	1100	2050
51	3375	830	425	875	1750
59	2775	760	575	1075	2050
43	3450	790	575	1100	2100
57	3225	800	525	1050	2000
56	3450	790	550	1100	2125
66	3300	770	550	1175	2300
45	3500	800	650	1250	2150
54	3425	800	650	1225	2325
62	3450	790	650	1275	2325
65	3450	770	650	1300	2500
27	3725	785	700	1425	2700
53	3800	795	650	1350	2600
67	3475	755	750	1500	2675
Average	3180	820	490	945	1785

	80 Minutes at 260° F.				
Sample	T. S.[a]	Elong.	500[b]	600[c]	700[d]
58	2750	875	300	575	1175
50	2900	855	375	650	1250
52	2700	860	325	575	1150
60	3300	875	400	750	1400
48	3000	830	400	800	1525
49	3100	865	400	750	1450
61	3350	840	425	800	1575
39	3400	855	450	850	1650
46	3175	840	400	800	1600
37	3400	830	450	875	1750
63	2900	835	450	800	1500
38	3100	800	450	950	1900
55	3050	800	550	1050	2050
69	3100	785	550	1025	1900
64	3275	845	500	925	1875
70	3200	800	550	1050	2025
47	3300	800	500	1000	1975
44	3325	815	550	1050	1900
68	3350	790	600	1200	2200
51	3325	800	500	1025	2025
59	3400	870	600	1100	2000
43	3350	785	600	1200	2325
57	3400	800	550	1100	2050
56	3600	800	600	1200	2375
66	3500	770	600	1250	2400
45	3650	800	700	1275	2425
54	3575	790	700	1400	2500
62	3300	765	650	1300	2450
65	3350	760	600	1250	2425
27	3250	720	800	1600	2950
53	3800	775	700	1400	2900
67	3275	725	800	1575	2825
Average	3265	810	535	1015	1985

[a] Tensile strength expressed as pounds per square inch.
[b] Modulus at 500%.
[c] Modulus at 600%.
[d] Modulus at 700%.

In addition to the recipe, the committee has prepared tentative specifications for sulfur, zinc oxide, mercaptobenzothiazole, and stearic acid to be used in the tentative recipe. The specifications as set up will permit the use of standard materials available on the market.

Sulfur (Natural Product)

Fineness. 100 per cent through 100-mesh screen
Moisture. Not over 0.25 per cent (2 hours at 105° C.)
Acidity. Not over 0.01 per cent (as H_2SO_4)
Ash. Not over 0.10 per cent
Purity. Not less than 99.5 per cent sol. in CS_2

Zinc Oxide

Free from grit
Fineness. 100 per cent through 100 mesh; 99.85 per cent through 300 mesh
Moisture. Not over 0.40 per cent (2 hours at 105° C.)
Specific gravity. 5.60 to 5.65
Lead. Not over 0.10 per cent (as PbO)
Copper. Not over 0.001 per cent
Manganese. Not over 0.003 per cent
Sulfur. Not over 0.25 per cent (SO_3)
99.75 per cent soluble in 10 per cent acetic acid solution

Mercaptobenzothiazole

Purity. Not less than 91 per cent mercaptobenzothiazole (Titration with alkali)
Fineness. 100 per cent through 100 mesh
Melting point. Minimum 165° C.
Ash. Not over 0.50 per cent
Heating Loss. Not over 1.00 per cent (2 hours at 105° C.)

Stearic Acid

Double pressed from animal fat
Titer. Not less than 52° C.
Acid Number. 185 to 200
Iodine Number. Not over 10

The committee feels that the reports and discussions at the New York and Akron meetings of the Division of Rubber Chemistry, in addition to the information contained in this report, are sufficient as far as presenting the problem of variability in curing properties of rubber to the producers is concerned. For the time being, at least, all that the committee can do is to continue to cooperate with the producers' technical organizations, as any improvements that may be made must necessarily result from the efforts of the producers.

Resume of Additional Activities

Several other items have been presented for consideration. These include aging, plasticity, packaging, cleanliness, etc. All of these items have been given consideration by the committee but no definite recommendations are ready at the present time. A brief resume of the situation on each is given.

Each of the committee members will study the aging data available and methods used in his own particular laboratory. The information from each of the laboratories is to be checked by all members of the committee and from the data thus secured a definite program will be outlined.

Before any definite report can be made on the subject of plasticity, it will be necessary to make a very careful survey of the various methods of determining plasticity now in use. A definite fundamental starting basis will have to be determined by unanimous agreement, among the committee members at least, obtained upon what properties should be studied in determining plasticity before recommendations to the division can be made.

The committee can do very little in the matter of cleanliness except to urge that the entire industry insist upon receiving a uniformly clean product. We know definitely from our contacts with the Far East that this item is being given considerable attention on the plantations.

As far as packaging is concerned, very little can be done owing to the present system of marketing rubber. One statement, however, can be made—namely, that bales are preferable to cases as far as cleanliness is concerned.

The committee is checking the general situation on latex and may find it advisable to study certain phases, but at the present time, it is not in position to report any progress.

Cooperation of All Members Sought

Since the committee is operating without funds, the amount of work done must necessarily be limited and the time involved will be considerable, involving years rather than months. The problems investigated must be broad and general, involving the industry as a whole. Specific problems dealing with some particular branch of the industry cannot be considered.

The committee wishes to express its appreciation to those who have offered to assist in this work and to urge that other members of the division submit any available data that may be on hand concerning the various problems under consideration. The committee in particular wishes to express its appreciation to the various organizations and individuals on the producing side of the crude rubber industry who have offered to cooperate with it.

E. B. Babcock Harold Gray *(Chairman)*
W. A. Gibbons G. A. Sackett
J. C. Walton
Crude Rubber Committee

Protex—A New Coating Material

UNDER the trade name of Protex, American Anode, Inc., Akron, Ohio, has introduced a new latex coating material said to be easily applied and readily removed. Its properties include flexibility and resistance to chemical action. According to R. W. Albright, general manager of American Anode, Protex is now being employed by bumper and other automotive parts manufacturers to cover metal parts, even entire automobiles having been coated with the new material for export shipment. Refrigerators and other articles with polished surfaces have also been successfully coated with this material giving protection against abrasion, bumps and corrosion during transportation and storage.

Stripping a coating of Protex from an auto bumper.

At present the most widely-used method of applying Protex is in combination with paper, the latex forming a binding layer between the article being covered and the wrapping paper, in some cases the paper being contiguous to the article and held in place by an exterior coating of latex. Another use for Protex is that adopted by a major shoe manufacturer who uses the material to coat white shoes during the process of manufacture, the protective covering being stripped from the shoe when completed, entirely eliminating the cleaning process formerly necessary.

Rubber-Bonded Cut-Off Wheels

THE USE of abrasive cut-off wheels in both stock rooms and production departments as a means of saving time and cutting costs has increased appreciably in recent years. There are three types of organic bonds used in the manufacture of cut-off wheels, viz: rubber, shellac and resinoid, each bond having a special application. A number of applications of the rubber-bonded wheel is listed in a recent issue of *Grits and Grinds*, house organ of the Norton Company, Worcester, Mass.

The rubber bond makes practical the manufacture of wheels as thin as .005 to .006 inch, a wheel of this type being used for slotting pen nibs. Wheels .020 to .025 inch thick are used for cutting tungsten rod, while glass tubing is being cut by rubber-bonded wheels .030 to .062 inch in thickness. Rubber wheels have proved superior to resinoid-bonded wheels on certain high-speed cutting operations where a more flexible wheel is required. The rate of cut and the type of abrasive cut-off wheel is dependent upon the material to be cut and the type of machine used, such as high- or low-speed, wet and submerged or portable.

Rubber-bonded wheels are generally used for wet and submerged cutting operations. They are also used for high-speed cutting of tubing and pipe and in many cases solid steel stock, a flexible wheel being required in the latter operation. Other materials which are now being cut by rubber-bonded abrasive wheels include concrete, fibre conduit, duraloy, serrating knives and pearl.

Rubber-Covered Vehicle Detectors

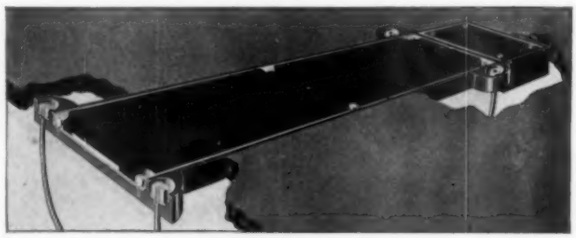
TWO new types of automatic systems for traffic control are reported to be reducing traffic accidents considerably at several points of installation. The systems, known as Electro-Matic and Traff-O-Matic, are manufactured by the Automatic Signal Corporation, of New York City, and make use of rubber-covered vehicle detectors. The detector is the "eye" of the system, as well as the key.

The vehicle detectors used in these systems consist of a slab of rubber welded to a steel base. They are 12 inches wide, 2 inches deep, come in lengths of 4, 6 and 8 feet, respectively, and are mounted flush with the highway. A control box which flashes the traffic signals is located at the best position possible, depending on the type of road intersection concerned, and is mounted on a nearby post. Between the vehicle detector and the control box, or the "eye" and the "brain" as they are called, run wires.

Pressure on the detector by passing automobiles sets a cycle in motion, governed by a vacuum tube in the control mechanism, which relays information relative to the traffic which is approaching the intersection, the presence and passage of vehicles, their number, speed and, where necessary, the direction of motion of each car.

The control mechanism receives these continuous "reports" and assigns right-of-way on the basis of maximum safety and efficiency. The control mechanism acts as a robot traffic officer. An exclusive principle of "static timing", by means of the vacuum tube in the control box, assures the correct operation of the system. Even the pedestrian has been taken care of, a push-button arrangement enabling him to stop cross traffic, subject to certain limitations.

The rubber welded to the steel base of the vehicle detectors is made of a special compound developed by U. S. Rubber Products, Inc., and is especially resistant to the actinic action of the sun's rays Since the wearing surface is constantly presented to traffic it was made to withstand rough treatment and bear up under varying changes in temperature.



Rubber-covered detector as installed on a highway.

Rubber Section, A.S.T.M., Meeting at Atlantic City

Symposium on the Limitations of Laboratory and Service Tests in Evaluating Rubber Products Will Feature July 2nd Meeting

THE Thirty-Ninth Annual Meeting of the American Society for Testing Materials will be held at the Chalfonte-Haddon Hall, in Atlantic City, N. J., from June 29 to July 3, inclusive. Committee meetings will be held on Monday, June 29, with the opening session set for the following morning at 10 A.M. when the regular business of the Society will be conducted, including a few committee reports, the annual address of the president, introduction of newly elected officers, and miscellaneous business.

The report of Committee D-11 on Rubber Products, of which Harlan A. Depew (American Zinc Sales Company) is chairman, will be rendered at the Fifteenth Session of the Convention, to be held at the Chalfonte-Haddon Hall on Thursday, July 2, at 8 P.M. The Committee will submit tentative revisions of the standard methods of chemical analysis of rubber products; propose revisions in the tentative specifications and tests for friction tape as well as in the test for compression set of vulcanized rubber, methods of tension testing, test for adhesion, for accelerated aging of vulcanized rubber, and test for adhesion of vulcanized rubber to metal.

Among other factors, Committee D-11 will recommend adoption as standard of the tentative methods of testing rubber belting and of the methods of test for rubber hose. It will also report its progress in the program for development of certified standard samples and discuss activities of various sub-committees, including the reorganization of the sub-committee on insulated wire and cable and the work of the sub-committee on life tests which has in preparation a proposed method for air bomb tests for publication as general information.

One of the significant factors in the improvement in the quality of rubber products during the past decade has undoubtedly been the development of improved testing methods, a number of which have been published by the A.S.T.M. These tests have been used by consumers in purchase specifications as well as for research and control of manufacturing.

Symposium Arranged on Evaluations

Because there is little doubt that in some cases these tests have been used unwisely in specifications, a symposium has been arranged on the "Limitations of Laboratory and Service Tests in Evaluating Rubber Products." This symposium, which will be held during the July 2nd session of Committee D-11, consists of five papers and deals with several important classes of rubber products and shows the relative importance of the following: (1) Laboratory tests in which pieces of the products are tested: (2) Laboratory performance tests in which the product is tested as a whole; (3) Service tests; and (4) The good name and reputation of the manufacturer.

The five papers to be presented at this symposium, their authors and company connections, and abstracts, follow:

SYMPOSIUM

Limitations of Laboratory and Service Tests in Evaluating Rubber Products

8 P.M.—THURSDAY—JULY 2

Methods of Evaluating Tire Performance. *R. D. Evans, Goodyear Tire & Rubber Co.*

By even the most detailed examination and tests on sections of a tire, only a vague estimate of its probable road performance can be reached. If by such examination, specific and outstanding weaknesses, either in quality of material or in features of design and of workmanship, are identified, poor road performance can usually be postulated. Failure to uncover such weaknesses is by no means a guarantee of good and well balanced durability in service.

However, a preliminary analysis of this sort can usually be relied upon to classify a product into the general groups of first grade, second grade, and third and lower grades.

By laboratory tests on mounted tires, specific types of failure can be developed, with an accuracy determined largely by the constructional uniformity of the tire or group of tires. For those types of failure which it is feasible to produce, a general accuracy of at least 10 per cent can be expected. Six such tests, some rotative and some static, are found useful in evaluating particular items of tire performance.

There are, however, certain types of structural breakdown which are encountered in road service and which it is not possible, or at least feasible, to develop in the laboratory. For these, and particularly for an accurate picture of the rate and type of tread wear, recourse must be had to road or fleet tests.

The Testing of Rubber Footwear. *W. E. Glancy, Hood Rubber Co.*

Inasmuch as the purchasers of rubber footwear, with few exceptions, do not test their goods nor have standard specifications, this paper considers testing from the point of view of the manufacturer.

It is pointed out that the many changes which have taken place in the manufacture of footwear compelled the producers to test the results of their changes as well as to note the value of the development work.

A description of the laboratory tests used and a discussion of the relation of service testing to laboratory testing are given.

It is concluded that neither method of testing is a substitute but that they are complementary to each other and that after results of each method are obtained, laboratory tests offer a high degree of confidence in the prediction of actual wear.

Significance of Laboratory Tests in Evaluating Automotive Rubber Parts. *J. J. Allen, Firestone Tire and Rubber Co.*

This paper attempts to show the value of various types of physical tests for evaluating automotive parts such as motor mountings, bumpers, shackles, hose, etc.

There are three types of testing methods in use at the present time: (1) Laboratory tests on samples of rubber

cut from the parts. These include Tensile Strength, Modulus, Elongation, Hardness, Compression Set, Abrasion and Resilience. (2) Laboratory tests on the parts as a whole where one particular service condition is chosen and the tests made under laboratory conditions. (3) Service tests where the parts are installed in the automobile and subjected to regular road or service tests.

This paper divides these tests into two groups:—Those that are used in the design or choice of the right quality of rubber for the particular part; and those tests that are used as control tests to check the uniformity of production.

Reference is made to several representative parts, since the field is too large to cover each item in use today.

The Relation Between Laboratory Tests and Service Life of Rubber Hose and Belting. *W. L. Smith and Arthur W. Carpenter, B. F. Goodrich Co.*

Brief consideration is given to the laboratory tests usually employed in the evaluation of rubber hose and belting emphasizing the characteristics which are actually measured by the tests and the significance of these characteristics in actual service performance. Some of the variables encountered in service and the degree to which these can be taken into account in the laboratory tests are discussed. Both tests of the usual physical properties and of the performance type are covered and laboratory test data and field service reports are given to illustrate the various points discussed. The paper supports the opinion that it is possible to evaluate the probable life of rubber hose and belting in many kinds of service by the use of properly designed laboratory tests although, in general, such evaluation requires the use of tests of the performance type. Since these tests are for the most part comparative, it is usually essential to have a background of both laboratory tests and service records on a product in order to predict in the laboratory the probable service of a given article or newly developed construction.

The Testing of Rubber Insulated Wires and Cables. *Dean Harvey, Westinghouse Electric and Manufacturing Co.*

A significant feature in the testing of rubber insulation on wires and cables has been the trend toward performance specifications for purchasing rather than to specify the composition desired. This paper gives the results of an extensive survey to determine present practices and trends in testing rubber insulation on cables. Tests which are discussed include chemical analysis, mechanical (tensile strength, elongation and set) aging, compression cutting, tear resistance, ozone-corona, water absorption and electrical tests.

Cable manufacturers indicate their belief that several carefully chosen tests which closely simulate service conditions will offer a good measuring stick for predicting the life of a rubber compound under ordinary conditions. Performance tests should be designed particularly for the service for which the cable is intended and not considered for the rubber alone.

There is shown the need for improvement and extension of performance tests to provide better quality control, and further work in interpreting aging tests and correlating them with service life. More adequate tests for moisture absorption and resistance to sunlight and ozone were requested, the survey shows.

T. 1.—A Latex Thickener

RECOMMENDED for practically all latex compounds for producing a wide range of viscosities up to pastes, a new latex thickener called T. 1. (T-One) has been developed by the Vultex Chemical Company, Cambridge, Mass. It is claimed to be extremely effective in small quantities and quite economical to use. When incorporated in latex compounds, T. 1. is non-stiffening and is not detrimental to the physical or aging properties. It is said to produce stable compounds, repress frothing, to be non-discoloring and is furnished ready to add to the latex compounds without previous preparation by the user. A patent on the new latex thickener has been applied for.

O-N-V—New Rubber Accelerator

A NEW accelerator, termed O-N-V, readily dispersing in rubber, has been developed by the Naugatuck Chemical Division of U. S. Rubber Products, Inc. It is a definite chemical compound—diphenyl carbamyl dimethyl dithiocarbamate—and is a yellow powder. It has a specific gravity of 1.19; a melting point of 183°-185° C.; and is soluble in most organic solvents and insoluble in water. The results of tests indicate that it has no toxic effect on workers handling it or rubber containing it.

Safety from scorching during processing or setting up in storage and rapidity of cure at vulcanizing temperatures of 250° F. and upward are two of its outstanding characteristics, according to Naugatuck Chemical, its safety having been demonstrated in factory operations. For vulcanizing at 25-30 lbs. steam pressure in mold or in live steam in 20 minutes, approximately 0.7% on the rubber with 3% sulfur is recommended, with higher temperatures suggested for shorter cures and accelerator reduction for longer cures.

O-N-V is a peak type, non-persistent accelerator, producing a moderately high modulus and is suitable for mold, steam or air vulcanization. Oxygen bomb aging tests indicated good aging qualities. It does not cause discoloration during vulcanization and can be used in white and delicately colored goods that are not exposed to strong light for extensive periods. It may also be used in combination with other accelerators, i.e., thiurams, thiazoles, amines and aldehyde amines. Stocks accelerated with O-N-V are said to have given good resistance to abrasion and flex cracking, while no blooming from uncured stocks or finished goods has been observed in tests conducted by the manufacturer.

The new accelerator may be used in mechanical rubber goods, wire insulation, sundries, footwear, soles, heels, and proofing. Both zinc oxide and fatty acids are desirable along with it, 1% of Laurex on the rubber being satisfactory in pure gum and lightly loaded stocks, with 2% Laurex recommended by the company for heavily loaded stocks. Master batching is not necessary in using O-N-V.

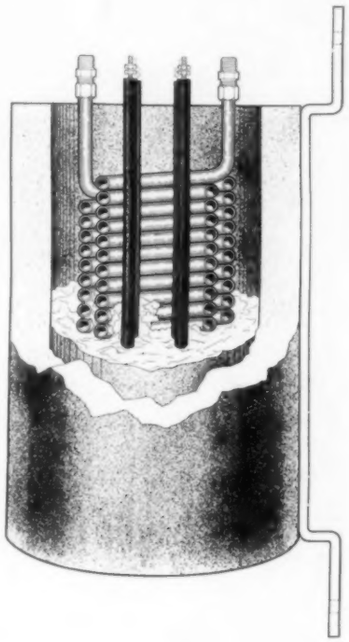
Bostik Waterproof Cements

SEVERAL new types of adhesives for use in connection with rubber are now being produced in this country by the Boston Blacking and Chemical Company, Cambridge, Mass., under the name of Bostik Universal Cements. These cements were originally developed by the company's German affiliate and are said to be widely used abroad. One type, No. 292, is used for setting glass in rubber channels, for one-way attachment of rubber sheets and matting to wood, metal floors, decks, automobile running boards, etc., and for attachment of rubber tiles to steel decks, metal stair-treads, stone, wood, etc. Type No. 292C is used for a "two-way stick," i.e., with the cement applied to both materials. Another type, No. 421, is a white cement especially adapted to the attachment of sponge rubber, rubber strips, gaskets, sheets, etc., to smooth or polished metal, stone, or similar surfaces, and to synthetic resin sheets. These cements do not dry out hard and brittle, but are said to retain a high degree of elasticity and are waterproof against both fresh and salt water.

New Equipment

Mold Super-Heating Unit

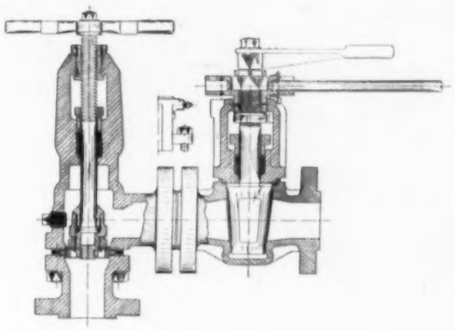
DEVELOPED for inflating molded tubes with super-heated steam instead of air, a super-heating unit recently developed by J. C. Clinefelter, Akron,



Ohio, is said to cut curing time by one-third and increase mold production fully 50%, when installed on an inner tube mold. Use of the unit is also claimed to improve and accelerate the cure by curing the inner surface of the tube simultaneously with its outer surface. The unit is 9 inches in diameter, 14 inches long, and weighs 45 pounds. It is heated by 500-watt heating elements, located inside a double helical coil of special steel tubing, each heating element being bent in a "U" shape with terminals projecting at the top. The special steel tubing may be varied in diameter to meet the specifications called for in individual services. Working temperature is variable with the requirements to be met and ranges up to 1000° F., being adjustable to the required point by regulation of the amount of external heat insulation. According to Mr. Clinefelter, the lower cost of steam compared with compressed air for inflation of molded tubes generally offsets the entire cost of the electric current required to operate this special super-heating unit.

Lift-Type Plug Valve

INCORPORATING positive mechanical seating and unseating, a new valve, known as the two-handle lift-type plug valve, has been introduced by the Homestead Valve Manufacturing Company, Coraopolis, Pennsylvania. It has been designed to overcome operating obstacles encountered with high temperatures, high pressures, infrequent operations, corrosion, etc., met in power plants, steel mills, refineries, oil fields, paper mills and chemical plants. A mechanical leverage lifts the plug vertically from its seat sufficiently to break the friction between plug and body and allows for the free rotation of the plug. By the same process, the plug is mechanically reseated. To operate this valve from a closed position, the plug is first raised only slightly from its seat by means of a handle which is fitted and fastened into the lifting mechanism. The plug is direct connected to this lifting arrangement. By turning the handle approximately one-quarter turn counter-clockwise, a positive upward movement to a predetermined point is produced. In this position,



free rotary movement of the plug is assured. The plug is then turned 90 degrees into position by its own handle. Reseating is accomplished by turning the lifting feature clockwise. Pressure range is from 125 and up, and temperature up to and including 750° F. The illustration shows the new Homestead Blow-off Combination.

Thermal Alumina Laboratory Ware

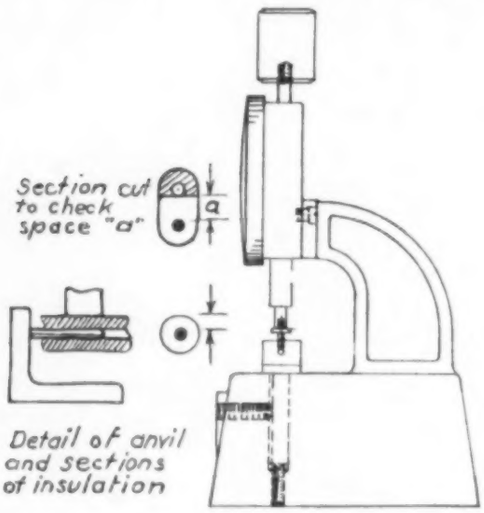
A LINE of refractory laboratory ware, termed Thermal Alumina Ware, has been developed by the Thermal Syndicate, Ltd., 70 Schenectady Avenue, Brooklyn, N. Y., extending its interest to high temperature refractories other than Vitreosil. The new line, at present, is limited to pieces of maximum size

3¼ inches diameter by 4 inches high, apart from tubes which are made up to 3-inch bore by 30 inches in length, these being sizes generally suitable for laboratory purposes. Thermal Alumina Ware is suitable for working temperatures up to 1950° C. and is fairly

resistant to thermal shock. The expansion coefficient is approximately 8 x 10^{-6} compared with 0.5 x 10^{-6} for Vitreosil. Alumina Ware is only slightly attacked by acids, by fused basic and metallic oxides at ordinary temperatures, and not at all by many fused metals, oxides and salts. Pieces of Thermal Alumina Ware are available in two grades of porosity, those of low porosity being unaffected by reducing gases and suitable for quantitative work, while those of higher porosity are more resistant to sudden temperature changes.

Insulated Wire Thickness Gauge

A SPECIAL portable gauge that measures the thickness of insulation on electric wire as well as the web and wall thickness of rubber tubing has been



developed by the Federal Products Corporation, Providence, R. I., and has been adopted by the National Board of Fire Underwriters, laboratory inspectors of which have already been supplied with the instruments. With the new gauge, POSJ cord and the insulation of other types of electrical conductors are readily checked without slitting the tubing. Off center insulation is also quickly determined. Rubber, being a compressible material, requires a predetermined amount of pressure exerted by the presser foot; therefore, a weight is mounted on the top of the presser spindle of the new gauge, and no springs are used. Ordinarily, according to the manufacturer, dial indicators are actuated by springs, hence the pressure is not constant throughout the range of the instrument, but the use of the weight in this instance obviates this discrepancy. The gauge checks to .0005 inches; the tube is inserted over the pin anvil as seen in the illustration; a hand lifting lever is provided; and the double dial, with telltale hand, makes for quick setting and easy reading.

Sullivan Unitair Compressors

INCORPORATING many advanced features in design and operation, the Sullivan Machinery Company, Michigan City, Indiana, has announced an improved line of Unitair compressors. The Unitair is a two-stage, completely air-cooled, V-type, single acting stationary compressor, and is designed for 24-hour service.

Book Reviews

The House of Goodyear. By Hugh Allen. Published by The Superior Printing and Lithographing Company, Akron, Ohio. 413 pp. $1.00 per copy.

"Business is still a human thing, and corporations whose men take a pride in it will go far," says the author in his introduction to this book, and then proceeds to make the following pages a "human" document of the history, policies, activities and troubles of Goodyear with particular emphasis given to the individuals who have made it the first ranking rubber manufacturing company. The book is written in an intimate, highly interesting style, Mr. Allen transforming each incident in the history of Goodyear into a readable and exciting phase. Consisting of 21 chapters and an appendix, The House of Goodyear delves into every angle of the company's business, which is so closely allied to the growth of the rubber manufacturing industry of the United States. The early days, development, compounding progress, founding of the Canadian and foreign factories, starting of the Goodyear rubber plantations in Sumatra and the cotton plantations of Arizona, the cotton mills, local expansion—all of these, and more, are treated with, the roles played by individuals associated with each new movement given equal prominence in the telling. With a frankness generally lacking in books of this type, Mr. Allen tells of Goodyear's financial troubles at different times, including the reorganization of 1921 when the Seiberlings left the organization. Even the current clash with the government over the Sears tire contract is discussed by the author who blames anti-trust laws forbidding manufacturers from making price agreements on merchandise and the lone wolf tendencies of two-fifths of the tire manufacturing fraternity for the rubber industry's long price wars and profitless operations. A chapter is devoted to Goodyear's part in the development of aeronautics, especially balloons and dirigibles. At the end of the book a chronology appears as well as a table showing the production facilities acquired by Goodyear in order of their founding or acquisition. A chart showing the fluctuations of crude rubber prices from 1875 to 1935 is also included. This book should be read by every member of the rubber industry, not solely for its tracing of the Goodyear company's fortunes, but for its excellent presentation of the problems of the rubber industry and the accomplishments which turned problems into projects.

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The American Rubber Industry. By Walter H. Dickerson. Published by the author at 500 Fifth Avenue, New York City. $25.00

Prepared in the form of a comprehensive survey for digestion by financial institutions and investors interested in the rubber industry, this book will bring a better understanding of some of the tremendous problems faced by the industry in the last fifteen years as well as a conception as to the future which the author regards very optimistically. The survey is split into three separate sections: The Recent History of the Industry; Present Condition of Six Leading Companies; and The Outlook for the Industry. It has many ramifications, briefly discussing each of the more important divisions of the industry, such as tires, mechanical goods, footwear, etc.; explaining the failure of the Stevenson plan; lauding the present restriction scheme for its price stabilizing effect; etc. Probably the most important feature of the book to investors is the detailed analysis of the "six leading companies", i.e., in order of their size in respect to net working capital, Goodyear, Goodrich, U. S., Firestone, General and Lee. Comparative earnings, share earnings, sales records, etc., for these companies are shown for the 1925-1935 period in a series of well laid out charts and graphs. All angles of the earning powers of these companies are discussed and commented upon by the author. A chapter on "General Conclusions and Observations" rounds out the survey and sums up Mr. Dickerson's personal opinions as to the future of the rubber industry.

Markets and Men. By J. W. F. Rowe. Published by The Macmillan Company, New York City. 259 pp. $2.00.

As the sub-title of this book indicates—A study of Artificial Control Schemes in Industry—it explains the history and workings of control schemes in several industries, including rubber, coffee, sugar, cotton, etc. The author, an English economist, has written the book in a style to be equally understood by both members of the industries discussed and the layman. The chapter on rubber restriction should prove especially interesting to members of the rubber industry since it gives a complete background of conditions in rubber cultivating countries which led to the current restriction scheme as well as the ill-fated Stevenson Scheme of 1925. The attitude of the anti-restrictionist, whose position the author also considers, is summed up in these words: "Of course the immediate results of restriction, provided you can enforce it, will be beneficial at least to the European estates, but what about the effects in the more distant future? Surely the fundamental problem with which the rubber industry is faced is whether the future lies with estate production or with the native production — whether, in other words, European estates can produce more cheaply than the Dutch native, because, if they cannot, the whole industry will pass into the hands of the natives." Mr. Rowe make no predictions for the future, merely stating that, "Time alone will show whether the fears of the anti-restrictionist will be realized."

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Rubber Latex. By H. P. and W. H. Stevens. Issued by the Rubber Growers' Association, 19 Fenchurch Street, London, E.C.3, England. 224 pp.

This is the fourth edition of the book treating with latex issued by the R. G. A., the first of which was published in 1928. It contains several minor alterations and additions and the list of patent abstracts, an important part of each edition, has been brought up to date. *Rubber Latex* treats with the properties, composition, coagulation, concentration, manipulation, and compounding of latex and latex pastes, as well as its stabilization for industrial applications. The vulcanization of latex and latex products, dipping, electro-deposition and the marketing of latex products are also discussed by the authors, both of whom are consulting chemists to the R. G. A. Abstracts of more than 1,000 recent British patents on latex and its uses are included in this edition, as is a bibliography of reference books and literature. Copies of the book may be obtained without cost on application to the Rubber Growers' Association.

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The Rubber Industry. Edited by H. B. Cronshaw. Published by Leonard Hill, Ltd., 17 Stratford Place, London, W. 1, England. 191 pp. 10 shillings.

Described as "an encyclopaedia of all information about rubber, its production, manufacture and products," this book is a completely revised edition of the book published first in 1930 under the name of "Rubber Information." In addition to revisions, this latest edition includes a 9-page section on latex describing its source and general properties, colloid characteristics, concentration, production of dipped goods, etc. As in former editions, there are lists of trade and registered names, compounding ingredients and other rubber chemicals, rubber trade statistics, plantation companies, products and equipment, as well as a dictionary of rubber terms. A bibliography of technical books on subjects of interest to rubber technologists is included.

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O-N-V Rubber Accelerator. Issued by the Naugatuck Chemical Division of U. S. Rubber Products, Inc., 1790 Broadway, New York City. 24 pp.

This is a report on O-N-V, the new rubber accelerator introduced by Naugatuck Chemical, and consists primarily of a series of charts and tables indicating the effect of alkali process tire reclaim, zinc oxide, whiting, magnesium carbonate and mineral rubber in O-N-V stocks, and the effect of carbon black loading, reinforcing clay and Gastex on O-N-V stocks. A description of the accelerator is also included as is a series of recommendations for its application in various compounds.

Workshop Receipts. (5 volumes). Published by the Chemical Publishing Company of N. Y., Inc., 148 Lafayette Street, New York City. $2.50 per volume.

The handling and treatment of every imaginable material is included in the five volumes in this set prepared for "manufacturers and scientific amateurs." Although it contains hundreds of formulas it is not a formula book, but rather one detailing processes, manipulations, and handy methods of materials used in the workshop, both industrial and of the home type. Each volume is replete with details and illustrations, with many trade processes and secrets included. There is information for every type of technical worker in this book, believed to be the only one of its kind printed in English.

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Our World Trade in 1935. Issued by the Foreign Commerce Department, Chamber of Commerce of the United States, Washington, D. C. 32 pp.

Crowded with statistics, this booklet is devoted to the value and volume of principal exports and imports between the United States and its chief foreign markets. It indicates that an upward level can be expected, based on 1935 figures, from the low points of international trade in preceding years. The booklet points out that the United States imported 1,045,380,000 pounds of crude rubber in 1935, the largest amount since 1931.

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More Facts on Technology and Employment. Published by the Machinery and Allied Products Institute, 221 North La Salle Street, Chicago, Illinois. 26 pp.

Published as a sequel to "Facts on Technology and Employment" (reviewed in a previous issue), this pamphlet presents further evidence garnered by the Institute that machine methods of factory production are not causing current unemployment. It points out that manufacturing industries have furnished sixteen times their share of new jobs in the last two years and presents data to prove it.

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Adsco Products for Steam Distribution. Catalog No. 35. Distributed by the American District Steam Company, North Tonawanda, N. Y.

This general catalog is a compilation of various bulletins issued by the company on its wide range of industrial products for steam distribution, including all types of valves, flanges, gaskets, gauges, heating systems, etc. The products are illustrated, described, discussed, with comments made on their applicabilities. Liberal use of tables, charts and graphs will help the user select the proper type of equipment.

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Hancock Forged Steel Valves. Issued by the Hancock Valve Division, Consolidated Ashcroft Hancock Co., Inc., Bridgeport, Conn. 20 pp.

This catalog illustrates and describes the line of forged steel valves for all steam pressure ranges up to 1500 pounds recently introduced by the company. Several tables are devoted to material specifications, dimensions, list prices and weights. The various styles of valves available in the new line are treated with individually.

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Texas Almanac and State Industrial Guide. Published by The Dallas News, Dallas, Texas. 512 pp. 65 cents.

Issued annually, this combination almanac and guide is regarded as the standard authority on Texas. In this latest edition several pages are devoted to the Texas Centennial Exposition which opened in Dallas on June 6 and is scheduled to run until November 29. The almanac is replete with information and statistics on the State, its industries, etc.

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Correction

In a review of the laboratory report "Dry Heat Curing for Proofing" issued by the Rubber Chemicals Division of E. I. du Pont de Nemours & Company, Inc., last month, Zenite, Heliozone and RPA No. 1 were all referred to as "accelerators." While Zenite is an accelerator, Heliozone is a waxy material which provides sun-checking resistance to rubber, and RPA No. 1 is a rubber peptizing agent which is effective in reducing the "nerve" or plasticity of crude rubber.

Editorial Comment

Labor Leaders?

THREE years ago the American Federation of Labor sent a few labor organizers, headed by one Coleman C. Claherty, to Akron to organize the rubber workers. That the organizers did a good job for Mr. Green and his Washington cohorts is seen in the steady growth of the union ranks in the rubber industry. That there may have been no need for organization of labor unionism in Akron, or other rubber centers, should not be argued at this late date. But the actions of the so-called rubber labor leaders are to be questioned.

The aftermath of several unecessary strikes at rubber factories in Akron was the evolution of a new labor development—the sit-down. Probably in no other industry can sit-downs cause so much trouble as in a rubber factory, where, as the insurgents well know, the crippling of one department can disrupt the operations of a half-dozen other departments. Sit-downs have become the order of the day in Akron rubber factories. At the slightest dissatisfaction with any move made by management, the workers drop their tools or sit idly at their machines, refusing to budge until matters are settled more-or-less to their satisfaction.

Labor leaders in Akron publicly deplore these sit-downs. They deny all responsibility for them, but once a sit-down has started they are forced to back up the protesting workers with all the means at their disposal. Are these the leaders of labor? Individuals who organize unions, negotiate with management, call strikes, appeal to the Government, and supposedly represent the voice of the thousands of rubber workers on their membership lists, and yet when needless sit-downs occur, when workers blockade themselves inside plants tying up production, when union members violently attack fellow workers—all of which occurred last month in the Goodyear factory—state that the troubles were "spontaneous" and "wholly unauthorized." Are these men labor leaders or merely pawns in the hands of radicals and trouble-makers? From recent labor disturbances in Akron, properly termed industrial anarchy, we are inclined to the latter belief.

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Tire Units or Weight?

SEVERAL months ago at a dinner in New York City at which the new Dual 10 tire was introduced to the Eastern trade, William O'Neil, president of the General Tire and Rubber Company, of Akron, addressed a group of newspaper representatives. During his address, in which he covered the rubber industry in an off-the-record manner, Mr. O'Neil suggested that some movement be undertaken to change the statistics covering tires from one of units to one of weights, since the amount of rubber used in the 1936 tires was more than in tires of previous years.

Figures made available by Hugh Allen in his just published book "The House of Goodyear" indicate the need for the suggested change in statistics. Allen reveals that 1935 was a "peak" year for Goodyear despite the fact that in 1929 the company made 23,073,556 tires compared with only 15,779,291 tires in 1935. He points out, however, that with the larger size tires averaging two pounds more rubber per tire in 1935 than in 1929, Goodyear used more rubber in 1935, using 125,000 tons as against 122,000 tons in 1929. On the basis of these facts, rubber statisticians should give more thought to Mr. O'Neil's earlier suggestion.

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Diplomacy vs. Action

RUBBER manufacturers should not be particularly pleased with the action of the U. S. Tariff Commission's arbitrary 42% average increase of the tariff on cotton goods materials imported from Japan. This unexpected move on the part of the Commission marks the breakdown of official negotiations with the oriental country looking for voluntary limitation by the country itself of the quantities of goods exported to this country. There is a strong possibility that the Commission will answer the demands of the rubber industry in this country for some solution of the Japanese competition in rubber toys and novelties by increasing the tariff on these items as in the case of the cotton goods materials, instead of instituting quota restrictions, which is more desirable to American toy manufacturers.

Despite the protests of the Japanese Ambassador that the extremely low prices on Japanese goods are due to "the art, industry and enterprise" of his race and "not to cheap labor," rubber manufacturers are unanimous in their belief that these low prices are due to the enormous difference in wages paid in this country and in Japan. Because of this differential, as well as government subsidies combined with utilization of the most modern labor-saving machinery, a doubling or even tripling of the tariff walls would fall short of the industry's objective, i. e., the decrease of Japanese importations.

Led by Dow Harter, Congressman from Ohio, Akron rubber manufacturers have been strenuously seeking government assistance to the point where specific quota limitations and more rigid anti-dumping regulations would be enforced. Therefore, raising of the tariff on cotton goods materials, ending as it does the possibility of Japanese self-regulation on exports to this country, may prove a boomerang to the rubber industry's campaign.

CURRENT • NEWS
of the Rubber Industry

JUNE, 1936

Supreme Court Denies U. S. Rubber's Appeal for Review of Drum Tire Machinery Decision

Decision Brings to an End Long Legal Fight to Compel Firestone to Pay Royalties to U. S. Rubber on Grounds of the Infringement of "Drum Method" of Tire Building

ON May 25 the United States Supreme Court denied an application filed by the U. S. Rubber Company on a writ of certiorari to grant a review and rehearing of evidence of its suit against the Firestone Tire and Rubber Company on alleged infringement of patents covering the band or drum method of tire building which has been in the Federal courts since 1932. The decision ended U. S. Rubber's long legal fight to compel Firestone to pay royalties for use of the tire building machinery involved. The suit entailed millions of dollars in possible royalties.

Submitting thousands of pages of evidence, as well as a flat tire as its chief exhibit, U. S. Rubber appealed to the Supreme Court on April 15 to grant a review of the decision of the Sixth Circuit Court of Appeals (Cincinnati) which had reversed the findings of a lower court as well as a special master both of which had originally found that Firestone was infringing the patents claimed as original by U. S. Rubber.

In its appeal U. S. Rubber specifically accused Firestone of "borrowing a set of patented tire devices for a 60-day trial" and that Firestone then "proceeded to practically duplicate this equipment in defiance of petitioner (U. S.) and its patents." Claiming that the "drum process" had revolutionized the industry, U. S. Rubber attorneys pointed out to the Court that all major tire manufacturers, with the exception of Firestone, were paying royalties for use of the process involved in the litigation.

At a hearing on May 16, Firestone attorneys asked the high court to deny a review of the Circuit Court's decision upholding Firestone in its non-infringement claims. They charged U. S. Rubber with "seeking to perpetuate the monopoly which it has enjoyed for a number of years."

Firestone Denies "Invention"

The Firestone petition claimed that "there is no more invention in this than in the common practice of buying a wool shirt oversize to take care of its shrinkage in the first wash." Firestone attorneys contended that of the four large tire companies affected by the decision U. S. Rubber and Goodrich had "private interests" involved and that Goodrich had turned over its patents to the "pool" operated by U. S. Rubber. They also alleged that one of the patents concerned in the suit was not concerned in the license granted to Goodyear.

Another charge made by the Firestone attorneys was that "none of the tire companies who were induced to take licenses from U. S. Rubber will be exercised over the virtual termination of the monopoly." Because of these, and other reasons, Firestone asked the court to deny the appeal.

History of the Proceedings

Although court proceedings in the case date back only to 1932, the suit was really started in June, 1928, when U. S. Rubber and Goodrich, as co-plaintiffs, filed a complaint against Firestone alleging infringement of eight patents containing approximately 140 claims, Goodrich later transferring its patents involved in the complaint over to U. S. Rubber, receiving a portion of collected royalties only. Starting in January, 1932, a special master presided at hearings over a period of several months during which the patents involved were reduced from 8 to 7, claims being reduced from 140 to 88.

In January, 1934, as a result of the hearings, Judge Jones of the U. S. District Court, at Cleveland, handed down a decision holding that Firestone was infringing on four of the patents, i.e., the Hopkinson patent covering the flat band method of building and shaping tires; the Gammeter patent on vacuum and fluid pressure shaping of casings; the Abbott patent covering the "U"-box tire former apparatus; and the Lough patent pertaining to a rubberized beaker strip applied to the pulley-band before expansion. These four patents were held to be valid and infringed upon, while two other patents were found to be valid but not infringed, and the seventh patent was held invalid, the latter being a Hopkinson re-issue patent.

On appeal, however, the Sixth Circuit Court of Appeals, at Cincinnati, ruled that Firestone did not infringe on six of the seven patents involved, infringement on the seventh, or Abbott patent, being dismissed "without prejudice" to U. S. Rubber on the grounds that Firestone had discontinued the infringing process.

Refusal of the Supreme Court to review the findings of the Sixth Circuit Court of Appeals definitely ends the suit originally brought by U. S. Rubber and Goodrich to obtain an injunction against Firestone to restrain its further use of the patents involved, to obtain an accounting to determine the profits accrued through their use, and to secure a judgment of damages as a result. The sum of $30,000,000 was rumored to be at stake in the long proceedings.

New High for Consumption

Crude rubber consumption in the United States during the month of April reached the figure of 51,897 long tons, according to the Rubber Manufacturers Association's monthly compilation. This represents the largest amount of rubber ever consumed in one month in the United States. The previous largest amount was 50,743 tons consumed in June, 1933. The increase is attributed to greater activity on practically all lines of rubber manufacture with emphasis on mechanical goods.

Holding Golf Tournament

The New York Metropolitan Luncheon Club of the National Association of Waste Material Dealers, Inc., was scheduled to hold a golf tournament and outing at the Larchmont Country Club, Orient Point, Mamaroneck, N. Y., on Monday, June 15. Luncheon, dinner, golf, swimming, cards, etc., were on the program for the day.

HOLD UNION STRENGTH PERIL TO RUBBER TRADE

In the first of a series of articles analyzing labor conditions in the major industries, particularly those now faced with unionization campaigns, a recent issue of the *Journal of Commerce* discusses the situation in the rubber manufacturing trade which it terms as "the most threatening of any of the major manufacturing industries."

The article points out that while the rubber workers' union lost membership after the settlement of the strike (by government intervention) in the Spring of 1935, it has made considerable gains in recent months. Since the turn of the year the union reports a more than 400% increase in membership in Akron factories. Membership gains are recorded after "sit down" protests and walkouts.

Personnel executives now estimate that considerably more than 50% of all the workers at the Firestone plant in Akron, and an even larger proportion at Goodrich, are affiliated with the union. Union strength at Goodyear, however, despite union claims, is considerably less, according to the analysis, impartial observers having stated that less than 20% of Goodyear workers have union affiliations. But what Goodyear unionites lack in numbers they make up in strength as signified by the recent tie-up of the Goodyear factory for more than a five-week period.

The rubber workers' union is reported to be the most militant and aggressive of any union in the manufacturing field. The constant bickering in Akron plants, especially at Goodyear where "sit downs" in the last few weeks have tied up operations for hours at a time, is indicative of the militancy of the union workers. In fact the union has unofficially gone on record as indorsing the use of violence in the rubber factories since it has demanded the release of workers arrested for attacks on fellow workers in the Goodyear plant. This incident occurred a few weeks ago when union workers "ganged up" on Lyle Carruthers, who had led a committee of non-strikers during the five-week strike seeking to return to work, and beat him so badly that his life was endangered. They were subsequently arrested for "an attack with intent to kill" and are standing trial.

Aware of Decentralization

Discussing the various decentralization moves being planned by Akron rubber manufacturers, and the reasons for these moves, the article states that the rubber workers' union is, of course, aware of this situation and is taking steps to meet it. If the tire companies can transfer a large proportion of their output to plants in other sections, they will, of course, be better able to resist demands of the union in the Ohio plants. As a result, the union is now carrying on an intensive organizing campaign in the other sections of the country. Recent evidences of such activity are the strikes at the factories of the Pennsylvania Rubber Company, and that at the International Latex plant in Rochester.

The union is especially concerned currently, however, with a drive on the West Coast plants, since these would assume considerably greater importance if production were shifted from Akron on a large scale.

The union faces considerable difficulty in unionizing the plants located in other sections of the country, however. For one thing, these other plants are not concentrated in a single community as is the case with the Akron factories. Usually they are situated in smaller cities, where unionization campaigns are not very popular.

On the Pacific Coast, the new union has secured and in some places invited the co-operation of the radical Maritime Federation, which is led by Harry Bridges. While such support helps the union in winning over the more radical workers, it proves a handicap in securing the affiliation of the great bulk of employes in the rubber plants.

The outlook for labor relations in the tire industry thus depends largely upon the extent to which the major companies can reduce their dependence upon their Akron plants, now the major source of supply, according to the article. Union domination in the factories in the Ohio cities seems likely to continue unless workers are faced by a real threat of a loss of jobs. On the other hand, the union will face serious troubles in attempting to gain control of the factories located in other sections of the country.

Coming Events

June 26. Akron Group, Rubber Division, A.C.S. Silver Lake Country Club, Akron.

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June 29-July 3. 39th Annual Meeting of the American Society for Testing Materials. Hotel Chalfonte-Haddon Hall, Atlantic City, N. J.

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September 7-11. Rubber Division, A.C.S. Pittsburgh, Penna.

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October 6. Los Angeles Group, Rubber Division, A.C.S. Los Angeles, Calif.

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October 6-7. Rubber Section, National Safety Council. Atlantic City, N. J.

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April 12-15, 1937. Rubber Division, A.C.S. Chapel Hill, North Carolina.

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September 13-17, 1937. Rubber Division, A.C.S. Rochester, N. Y.

Form Needham Rubber Co.

The Needham Rubber Company, at Needham, Massachusetts, has been organized to manufacture, reclaim and deal in rubber fabrics, cloth, etc. Aaron L. Feinberg, of Newton, Mass., is president and treasurer of the new company, according to the incorporation papers.

ADDITIONAL INCREASE SEEN IN TIRE PRICES

An additional increase in tire prices may be announced in the next few weeks, prior to the July 4th holiday, according to rumors in trade circles. Indications point to an upward revision of 5 to 10%, approximately equal to the increase announced on May 4 which the industry absorbed in stride. In addition to the necessity of raising prices to meet with increasing costs of raw materials and higher wages, the move is believed to be a further step in the program of the tire manufacturers to eliminate price-cutting methods.

Both of the leading mail order houses, Sears-Roebuck and Montgomery-Ward, announced increased tire prices shortly after the tire makers made known the advanced rates. Sears announced a "slight" increase and stated that the new prices would be put into effect "in the near future" and would vary in different localities in accordance with local conditions, while Montgomery-Ward stated that the increase would be in amounts depending on the size and grade of the tire.

ORDER LIQUIDATION OF INDIA TIRE COMPANY

Following the receipt of a report by Harry L. Snyder, of Akron, referee in bankruptcy, Federal Judge Samuel West, of Cleveland, on May 28, ordered the liquidation of the India Tire Company, Mogadore, Ohio. The company had attempted to secure approval of a reorganization under Section 77-B of the Federal Bankruptcy Act, but had failed to devise a plan which met with the approval of a majority of creditors and stockholders.

The court ordered India Tire to proceed with liquidation of its assets and appointed J. T. Fisher, secretary of the company, as temporary trustee in liquidation. In his report Mr. Snyder told the court that the company was not in condition for reorganization and suggested liquidation. There is a slight possibility that creditors and stockholders may agree on a plan to halt the liquidation order before actual steps are taken.

Dayton Sales Gaining

Sales of the Dayton Rubber Manufacturing Company, Dayton, Ohio, for the first five months of 1936 were 83% ahead of sales in the same period last year, according to J. A. MacMillan, recently advanced from the presidency to chairman of the board of directors. Excluding McClaren tire sales, total sales gained about 30%, about 50% of the gain being registered in the V-belt and mechanical goods departments, the remainder in tires and tubes. Net profit on all lines for the first five months of the current year was 3.26% of total sales as compared with a loss for the same period a year ago.

CURTIS JOINS R. T. VANDERBILT COMPANY; U. S. RUBBER ADVANCES COE AND CASEY

After twenty-three years of service with the U. S. Rubber organization, E. B. Curtis has resigned his position in charge of sales for the Naugatuck Chemical division, effective June 15, to become associated with the R. T. Vanderbilt Company as assistant to Dr. A. A. Somerville.

This announcement, which comes as

E. B. CURTIS

a surprise to the many friends of the popular "Curly" Curtis, brings together again two rubber technologists who worked in the same laboratory of the U. S. Rubber Company in New York for three years beginning in 1915. At that time Dr. Somerville was in charge of the compounding, mill room and physical testing laboratory, and Mr. Curtis was his assistant. When Dr. Somerville was sent to the main office under E. J. Coughlin, general manager, Mr. Curtis took over his duties at the laboratory.

Dr. Somerville joined Vanderbilt in June, 1919, while Mr. Curtis continued with U. S. Rubber in various departments. In his new position, Mr. Curtis will relieve Dr. Somerville of many of his present duties so as to make it possible for the latter to carry out development plans for the company.

Ernest Baine Curtis is 46 years old and is a native of Indiana, having been born in Martinsville on April 14, 1890. He was graduated in 1912 from the University of Indiana with an A.B. degree and received his A.M. the following year. His first position was with U. S. Rubber in 1913 when he started at the New York Belting and Packing Company plant in Passaic, spending two years learning the rubber business from the ground up by working in all departments of the factory. After this training he was transferred to the General Laboratories in 1915 in New York City where he remained until the Fall of 1924. During the last five years of this period he was assistant to C. E. Bradley, director of the laboratories.

In 1924, when the Naugatuck Chemical Company was expanding its line of chemicals and other products, Mr. Curtis was transferred to that division and placed in charge of sales. He has been with Naugatuck ever since, rising from sales manager to vice-president in 1930. It was during this period that Naugatuck developed and introduced many new chemicals for use in rubber compounding. Mr. Curtis enters his new duties with a valuable experience and with a host of friends in the rubber industry who wish him every success.

Changes at U. S. Rubber

The resignation of E. B. Curtis from the Naugatuck Chemical Division, U. S. Rubber Products, Inc., brings about a number of promotions in that division. As announced by Elmer Roberts, vice-president of U. S. Rubber Products, John P. Coe, factory manager of Naugatuck chemicals and reclaims, has been placed in charge of all Naugatuck sales and has been transferred from Naugatuck, Conn., to New York City where he will make his headquarters at 1790 Broadway. Robert E. Casey, assistant to Mr. Curtis and covering the New York Metropolitan territory, has been placed in charge of rubber chemicals, reclaim and labels. John E. Caskey, assistant factory manager at Naugatuck, has been advanced to factory manager.

No changes have been announced in the balance of the selling organization of Naugatuck.

Coe an "Old Timer"

John Parks Coe, popularly known as "Jack," who has been advanced to the position of sales manager, has been with the U. S. Rubber organization since 1913 when he started in the G. & J. Tire factory at Indianapolis where he remained for one year before being transferred to the General Laboratories in New York where he worked on process and compound development.

During 1917 and 1918 Mr. Coe did war work for the Navy on gas masks, developing a new type of mask which was adopted by the Navy and manufactured at the U. S. plant in Providence. He continued his work on gas masks until 1919 when he was returned to the General Laboratories where he was placed in charge of general development and compounding, with special emphasis on tires, particularly the flat-band process.

In 1929 he was transferred to the Detroit plant where he organized and was in charge of the Tire Development Department. In 1930 he was brought back to New York as assistant to Elmer Roberts, then president of the Naugatuck Chemical Company (before it was made a division instead of a subsidiary) and in 1931 was made factory manager of the chemical and reclaim plants at Naugatuck, Conn.

Mr. Coe was born in 1889 in Rock Falls, Ill., and after attending the University of Kansas for a year transferred to Washburn College in Topeka from which he was graduated in 1911, receiving an A.B. degree. He then attended M. I. T. in Cambridge and received a B.S. in 1913. In addition to his many other activities, Mr. Coe was secretary-treasurer of the New York Group, Rubber Division, A.C.S., in 1931 and chairman of the Group in 1932.

Casey Is Well Known

Robert E. "Bob" Casey, who has been placed in charge of sales under Mr. Coe, is well-known throughout the rubber industry having not only travelled the New England territory but also the Chicago and mid-West and the Metropolitan New York districts for Naugatuck. Mr. Casey was born in Richmond, Vermont, in 1899 and is a graduate of the University of Vermont, class of 1919. He received a B.S. degree.

His first position was with the Calco Chemical Company where he remained until 1922 when he joined the U. S. Rubber organization as a chemist at the Naugatuck Chemical plant. After four years in that position he was transferred to sales where he has remained ever since.

JOHN P. COE

ROBERT E. CASEY

Financial News

U. S. Calling Notes

The United States Rubber Company was expected to call its remaining outstanding 6½% serial gold notes on June 15. On December 31, 1935, $3,836,000 of these notes were outstanding, representing maturities due on March 1, 1939 and on March 1, 1940. The notes are callable on any interest date at par, plus one-half of 1% for each six months of the unexpired term. The next interest date is September 1, 1936. Dated March 1, 1925, there were originally $30,000,000 in outstanding notes in this series, all maturing serially until 1940 at $2,000,000 annually. Calling of the balance of the notes outstanding is in keeping with U. S. Rubber's refinancing program now in progress.

6-Month Profit for Lee

For the six months ended April 30, 1936, the Lee Rubber and Tire Corporation, Conshohocken, Penna., reports a net profit of $101,296, after Federal taxes, depreciation, interest and other charges, equal to 39 cents a share. This compares with a net profit of $112,970, or 44 cents a share, for the corresponding period in the last fiscal year. Net sales of $4,100,427 were recorded for the six month period, a 10% increase over net sales in the corresponding period in 1934-35.

Profit for N. J. Zinc

The New Jersey Zinc Company reports net income of $1,074,179 for the first quarter of this year, after depreciation, depletion, taxes, contingencies and other charges, equal to 55 cents a share on the outstanding $25.00 par shares. In the 1935 period the net income was $1,060,889, or 54 cents a share.

Raybestos-Manhattan Profit

For the quarter ended March 31, 1936, Raybestos-Manhattan, Inc., Passaic, N. J., earned net income of $365,720, equivalent to 57 cents a share on 635,200 capital shares, excluding 40,812 held in the treasury. This compares with net income of $310,633, or 48 cents a share, in the 1935 quarter. The balance sheet at March 31 reveals total assets of $17,667,146, including $8,704,794 of current assets.

Columbian Increases Profit

For the first quarter of 1936, the Columbian Carbon Company and subsidiaries report a net profit of $1,027,011, after depreciation, depletion, taxes and minority interest, which compares with a net of $787,055 in the corresponding quarter of 1935. Net for the 1936 quarter is equal to $1.91 a share on 537,586 common shares outstanding compared with $1.46 in the 1935 corresponding period.

Fisk Omits Dividend

Fisk Rubber Corporation, Chicopee Falls, Massachusetts, omitted payment of its regular quarterly dividend of $1.50 on the preferred stock which was due last month. No reason for the omission was given by the board of directors. The senior issue in the curb market declined several points when notice of the omission was received.

Norwalk Loss Increased

For the six months ending March 31, 1936, the Norwalk Tire and Rubber Company, Norwalk, Ohio, had a net loss of $31,025, which compares with a net loss of $5,323 sustained in the six month period ending March 31, 1935.

Pacific Rubber Busy

The Pacific Tire and Rubber Company, organized by C. P. Turner, of Los Angeles, to operate the former factory of the Coast Tire and Rubber Company at Oakland, California, reports that the plant is working 24 hours a day and is producing 1,350 tires daily, practically maximum for the factory. Mr. Turner, who spent several days in New York City last month in the interests of the Pacific company, planned to attend the tire trade hearings sponsored by the Federal Trade Commission which were held in Chicago on June 4.

Shunk is Henderson Receiver

John Q. Shunk, president of the Henderson Tire and Rubber Company, Bucyrus, Ohio, was named receiver for that company by Paul D. Roach, referee in bankruptcy, on May 7. Henderson, which has been in financial difficulties for several years, has been operating under a temporary reorganization plan the set period of which terminated on April 18. A creditors' meeting will be held in the early future to determine whether the plant shall continue to operate or not. Under normal conditions, the Henderson factory employs 100 persons.

Form Surgical Rubber Co.

The Surgical Rubber Company, of Massillon, Ohio, was incorporated at Columbus last month for 250 shares, no par value. Incorporators were W. H. Harris, N. E. Ries and Thomas Batten.

SCRAP RUBBER EXPORTS CONTINUE TO INCREASE

Exports of scrap rubber from the United States during the last seven years were maintained at a level higher than the figure for 1928 which, in turn, was the highest for any previous year, and the 1935 exports even exceeded the all-time high record established in 1929, figures compiled by the Leather and Rubber Division of the Department of Commerce reveal.

American exports were better maintained during the 1930-33 period than those of European countries, domestic exporters finding new markets to make up for reduced European buying. British exports of scrap rubber likewise established a new high in 1935, but exports from Canada, France and Germany, the other countries which export important quantities annually, were all lower than in the previous year.

The total international trade in round figures, and the percentage supplied annually by the United States, since 1928, follows:

	Total Trade Long Tons	*United States Per Cent*
1928	50,400	40.2
1929	57,700	43.6
1930	45,400	52.8
1931	40,750	58.4
1932	39,250	55.9
1933	39,150	55.8
1934	45,250	50.8
1935	47,800	53.8

The Leather and Rubber Division points out that the collection of scrap rubber is carried on systematically in North America and Europe, the outlook for increased United States exports for 1936 being favorable.

TRENTON NEWS

The United Rubber Workers of America and the American Hard Rubber Company, of Butler, N. J., have renewed the working agreement of the employes after some revised provisions. The new agreement will run for a year. Aged employes will be given easier jobs at a minimum wage of 45 cents an hour. Piece workers on jobs of no set rate will be given a special day rate of not less than 55 cents an hour, an increase of 5 cents. Seniority lists will be revised quarterly. No reduction in wage rate will be made until the union has approved the same.

The majority of the Trenton rubber manufacturers had exhibits at the recent "Loyal to Trenton" exhibition at the Trenton Armory. Various kinds of rubber products were given as prizes to visitors by the concerns.

Eighteen women employes of Youngs' Rubber Corporation, Trenton, went on strike recently following a wage dispute. The plant management engaged new employes in their place.

FREE TIRE INSURANCE OFFERED BY SEARS CO.

In an unprecedented merchandising move, Sears, Roebuck and Company last month announced the granting of free insurance policies with the purchase of its two high grade tires, the Sears Allstate and Super Quality. The policies, backed by Lloyds of London, offer the sum of $1,000 in the event of a death resulting from a blowout or collapse of the tires within one year from the date of purchase, or $500 to $1,000, on a graduated scale, for dismemberment or loss of eyesight from the same causes. Recent attention given to blowouts is said to have been the reason for the move.

According to Sears' executives, the free insurance plan will force many motorists to purchase the higher priced tires as well as to secure brand new tires when the insurance lapses after one year so that they will continue to receive the protection offered. The mail order company was obliged to turn to Lloyds because American insurance companies unanimously turned down the plan, which, incidentally, cannot be used in New York State where the use of insurance policies as premiums is banned.

Premiums on the insurance policies will be paid by Sears during their life, it is explained, the offer backing up the 18 month guarantee given by the company on its high grade tires, which are still being produced by Goodyear.

1935 TIRE SALES SHOW INCREASE OVER 1934

The value of shipments by the tire industry in 1935 was 7.5% greater than that in 1934, according to statistics compiled by the Rubber Manufacturers Association. With values raised to 100%, tire shipments in 1935 totaled $322,770,000 while in the previous year the 100% figure was only $300,000,000.

According to the survey, sales of the rubber industry as a whole during 1935 materially exceeded those of 1934 and 1933. The value of wholesale shipments by all branches of the industry was placed at $554,162,000 as compared with $520,479,000 in the preceding year and $480,478,000 in 1933.

In the tire industry every division showed an increase with the exception of that representing solid and cushion tires.

Increased activities in the retreading field were reflected in the shipments of tire sundries and repair materials valued at $13,728,000 as compared with $11,860,000 for the previous year, an increase of approximately $2,000,000.

1935 CONSUMPTION SET AT 491,544 TONS

The 1935 survey of United States consumption of crude and reclaimed rubber and year-end stocks of these materials, conducted by the Leather and Rubber Division of the Department of Commerce at the request of several trade groups, indicates that crude rubber consumption amounted to the record high total of 491,544 long tons. The Rubber Manufacturers Association recently set this figure at 497,150.

According to the Division's survey, consumption of reclaimed rubber during 1935 is estimated at 117,523 tons, or 23.9% of the amount of crude rubber used. The corresponding percentage for 1934 was 22.2% and for 1933 it was 21.2%. Despite a lower average price for crude during 1935 than 1934 and despite the large increase in tire production, in which a lower percentage of reclaim is used than in other rubber products, the percentage use of reclaimed rubber increased somewhat.

The nation-wide crude rubber inventory at the end of 1935 is estimated at 303,000 tons, a decline of 52,000 tons from the figure of December 31, 1934.

Stewart Bolling Moves

Stewart Bolling and Company, Inc., has moved its main offices and assembly plant to 3190 East 65th Street, in Cleveland, Ohio, where increased manufacturing and assembly space is available. The company supplies rubber and other machinery of all types.

Increases Clay Production

The Southeastern Clay Company, with plant at Aiken, South Carolina, and offices at 70 Pine Street, New York City, recently issued a 4-page mailing piece which describes its Crown brand of clays for use in the rubber industry. The company, which has mined and marketed its Crown Clay for many years, has uncovered large and new deposits, while processing methods have been improved and perfected, the combination of both factors now making it possible to supply the clay to every rubber manufacturer. Heretofore, according to the circular, the clay was produced to meet a limited demand only. Herron and Meyer, Inc., of New York and Akron, are sales agents for Crown Clays.

Inland Plans Addition

The Inland Manufacturing Company, General Motors subsidiary, at Dayton, Ohio, is planning the addition of 4,000 square feet of building space for its running board department, at a cost of $5,000. The company is also planning the installation of 10 new hydraulic presses, as well as two air compressors of 1360 cubic feet each. Some new testing machinery has also been recently installed in the factory.

GOODYEAR COMPLETES ITS 250,000,000th TIRE

Left to right: R. S. Wilson, P. W. Litchfield, L. E. Judd, and L. H. Shepherd

Completion of its 250,000,000th tire was announced by the Goodyear Tire and Rubber Company, Akron, last month. Company officials, including Paul W. Litchfield, president, and R. S. Wilson, sales manager, participated in the ceremonies as the tire was built up and cured, with Mr. Litchfield applying the tread to the tire. The tire was a Double Eagle Airwheel, the "super" tire recently announced by Goodyear in the popular size for lower-priced cars. The tire bearing No. 250,000,001 was one of the new All-Traction tractor tires for farm use. According to Goodyear statisticians, production of the quarter-billion tires in the history of the company consumed approximately 1,200,000,000 pounds of cotton (2,400,000 bales) and 2,750,000,000 pounds of rubber which, under the present restriction scheme, represents all the rubber the world will produce in a year and a half.

Names in the News

DR. WARREN F. BUSSE has been named manager of the physical research laboratories of the B. F. Goodrich Company, Akron, succeeding the late DR. E. O. DIETERICH. DR. BUSSE has been a member of the Goodrich research staff since 1928.

COLONEL J. A. KICK, who has been advertising manager of the General Tire & Rubber Company, Akron, since 1931, resigned from that post on May 22.

WALTER GELDARD was recently appointed chief chemist of the Fisk Rubber Corporation, Chicopee Falls, Mass. He has been with the company for several years.

CHARLES F. GURNHAM, formerly with the development department of the Ludlow Mfg. & Sales Company, has joined the chemical staff of the Naugatuck Chemical Division, U. S. Rubber Products, Inc.

WALTER L. TANN, hydraulic engineer, Farrel-Birmingham Company, Inc., Ansonia, Conn., addressed the members of the Providence Engineering Society at Providence, R. I., on May 7th, on "Hydraulic Presses and Other Applications of Hydraulic Power."

F. G. ARNOLD, chief chemist, Rapid Roller Company, Chicago, sailed on the "City of Norfolk" on May 22 for a two-month vacation tour of Europe during which he will visit England, France and Germany.

RAYMOND BITTERS, chemist, Eagle Rubber Company, Ashland, Ohio, spoke to members of the Ashland College "Gooch" Club on "The History and Development of Rubber Latex" last month. Membership in the club is based on scholarship and character.

CARL L. REED, export manager, Kelly-Springfield Tire Company, Cumberland, Maryland, has sailed for Europe in the interests of the company. He will visit several countries, returning to the United States in the early part of September.

PAUL VAN CLEEF, of Van Cleef Brothers, was recently elected chairman of the Chicago Section, A.C.S., for the year commencing July 1.

A. W. DODD was elected a vice-president of the American Zinc, Lead and Smelting Company at the recent annual meeting of the company's board of directors.

THEODORE M. SWITZ has resigned from the Barrett Company to accept a post as technical director of the Pulp Products Company, Massillon, Ohio.

H. WALTER GROTE, of the United Carbon Company, Charleston, West Virginia, sailed for an extended tour of Europe on the Bremen on May 29, during which he will visit England, France, Germany, Holland, Belgium, Italy, Sweden and Russia in the interests of his company.

F. ROY CAREY, New England representative of THE RUBBER AGE joined the ranks of proud parenthood last month, when a boy was born to MRS. CAREY. Both mother and heir are reported doing nicely.

E. J. THOMAS, assistant to the president, Goodyear Tire and Rubber Company, Akron, was awarded a 20-year service pin on May 25.

STACEY G. CARKHUFF, secretary, Firestone Tire and Rubber Company, Akron, lost an appeal for $14,154 income taxes claimed by the government in the U. S. Circuit Court in Cincinnati, last month.

BERNARD H. JACOBSON, formerly general manager of the South Charleston plant of the Calco Chemical Company, has been named general manager of Ohio-Apex, Inc., Nitro, W. Virginia, succeeding the late C. OLIN NORTH.

LESTER H. MERCER has resigned as sundries sales manager of the Miller division, B. F. Goodrich Company, effective June 30, to accept the position of director of the Red Cross division of Johnson & Johnson, Inc., at New Brunswick, N. J.

WILLIAM O'NEIL, president, General Tire and Rubber Company, Akron, was interviewed by JOHN B. KENNEDY, famous news commentator, on "Highway Safety" on radio station WGAR on May 27.

LOUIS J. DE HOLCZER has joined the staff of the Appleton Rubber Company, at Franklin, Mass., rubber reclaimers and compound specialists.

URBAN MOLER, personnel director of the Inland Mfg. Company, and R. M. WEINER, personnel director of the Dayton Rubber Mfg. Company, both of Dayton, Ohio, attended sessions of the Ohio Safety Congress, held in Columbus on June 2, 3, and 4.

F. E. TITUS, vice-president, Pacific Goodrich Company, Los Angeles, is reported recuperating from an appendectomy performed late last month.

GEORGE E. PELL, associated with crude rubber activities for many years, has joined the Andean Trading Company, 132 Front Street, in New York City, as manager of the Import Department.

Page Accepts Directorship

Harold James Page, Controller of Agricultural Research, Imperial Chemical Industries, Ltd., London, England, has accepted the post of Director of the Rubber Research Institute of Malaya, and will leave the United Kingdom for Kuala Lumpur early in July. He succeeds Lt.-Col. B. J. Eaton, who is retiring. Acceptance of the post was announced by the Advisory Committee of the Rubber Research Institute, at London.

Japan's Use of Latex

Returning from a recent visit to Japanese rubber factories, Dr. G. M. Kraay, of the Rubber Research Bureau, at Buitenzorg, Java, N. E. I., found that latex was being studied all over the country by university professors as well as works engineers and production executives. In Dr. Kraay's opinion, "This means that within a short time Japan will be able to manufacture improved articles at a lower price, as it is a known fact that the quality of articles made from latex is of the highest order." He also stated that latex is especially adapted for use in Japan as its use does not require heavy machinery.

I. G. NEEDLES, associated with Goodrich for the past eleven years, has been appointed merchandising manager, tire division, B. F. Goodrich Rubber Company of Canada, Ltd., a newly created post.

DOUGLASS B. BULLARD is now a member of the chemical research division of the B. F. Goodrich Company, Akron. He was formerly on Georgia Tech's chemistry faculty.

H. C. MORTON, affiliated with the Russell Mfg. Company for the past five years, has accepted a position as research chemist with the Keasby & Mattison Company, Ambler, Penna.

FRANK G. MOORE, traffic manager of the Southern Alkali Company, a Pittsburgh Plate Glass subsidiary, is also acting as divisional traffic manager for the Columbia Alkali Company, Barberton, Ohio, another Pittsburgh subsidiary.

C. EDWARD KURT has left the tire development division of U. S. Rubber Products, Inc., to join the chemical research department of the Ethyl Gasoline Corporation, at Detroit.

RALPH REEL, chief chemist, Pharis Tire & Rubber Company, Newark, Ohio, was installed as president of the Newark Lions Club last month.

NORMAN A. SHEPARD, director of technical research, American Cyanamid & Chemical Company, was elected councilor of the recently authorized Western Connecticut Section of the American Chemical Society.

RUBBER GROUP ACTIVITIES

Rhode Island Club Elects New Officers and Hears Dinsmore; Wakefield Addresses Boston Group; Akron Plans Its Outing

Rhode Island Rubber Club

Approximately 140 members and guests attended the Spring meeting of the Rhode Island Rubber Club held on June 4 at the Metacomet Golf Club, East Providence. The annual golf tournament of the Club was held in the afternoon with a record number of 80 players participating.

The following won golf prizes: *gross for club members* — John Marshall (Collyer Insulated Wire), Ray Newall (Respro), and Mr. Manson (Appleton); *gross for guests* — Charles Rounds (Brown University), Harold Simmons (Industrial Paper), and E. M. Rupert (U. of Alabama); *low net* — H. E. Thompson (Anaconda), Charles Haynes (Binney & Smith), and Francis Jacoby (Jacoby & Co.); *blind bogey* — L. D. Walker (Collyer Insulated Wire), George Wilson (Wilson Co.), and Mr. McLain (Davol Rubber).

Following the dinner, H. E. Thompson, of the Anaconda Wire and Cable Company, announced the selections of the Nominating Committee for new officers for the ensuing year, all of whom were elected without opposition. The new officers are: F. E. Rupert (Anaconda), president; Sam Tinsley (Coated Textile), secretary-treasurer; and an executive board of eight members including D. C. Scott, Jr. (Scott), E. L. Hanna (Davol Rubber), D. G. Madge (U. S. Rubber), Gladding Price (Vanderbilt), Charles Berlow (American Wringer), Arthur Carr (Carr Mfg. Co.), Carl Short (U. S. Rubber), and Alfred B. Lingley (Phillips-Baker). Ex-president Lawrence D. Walker, of Collyer Insulated, is also a member of the executive board.

Dinsmore Delivers Address

After the elections, R. P. Dinsmore, assistant factory manager, Goodyear Tire and Rubber Company, Akron, was introduced as the only speaker of the evening. Taking as his topic "The Rubber Business at Home and Abroad", Mr. Dinsmore compared the industry on both sides of the Atlantic and confined his remarks to general matters. He credited the British with the foundation of rubber manufacturing efforts and mentioned many articles that originated on the Continent, stating that the development in the United States came after the development of new processes.

Comparing the rubber industries of the United States, Canada and England, Mr. Dinsmore asserted that this country now has 70% of the rubber business of the world. He remarked upon the fact that machinery developed abroad, as a rule, is small and simple compared to the larger and more costly machinery developed and used in the United States. In mentioning the status of the rubber industry in Russia, the speaker stated that it could not be measured with any degree of certainty because of close censorship.

The following companies donated cash and prizes distributed at the outing: American Zinc Sales Co.; Anaconda Zinc Oxide; Ansbacher-Siegle Corp.; Binney & Smith Co.; Carr Mfg. Co.; E. I. du Pont de Nemours & Co., Inc.; Eagle-Picher Sales Co.; Farrel-Birmingham Co., Inc.; General Atlas Carbon Co.; Hoiowax Corp.; Industrial Paper & Cordage Co.; Monsanto Chemical Co. (Rubber Service Laboratories Division); Moore & Munger; H. Muehlstein & Co., Inc.; Naugatuck Chemical Co.; N. J. Zinc Co.; Pequanoc Rubber Co.; Philadelphia Rubber Works; Southeastern Clay Co.; Stamford Rubber Supply Co.; Wm. R. Thropp, Inc.; United Carbon Co.; U. S. Rubber Reclaiming Co.; R. T. Vanderbilt Co.; L. G. Whittemore; Xylos Rubber Co.; and Wishnick-Tumpeer, Inc.

Boston Rubber Group Meets

Over 100 members and guests of the Boston Group, Rubber Division, A. C. S., attended a meeting held on May 27 at the Hotel Kenmore, in Boston. H. F. Wakefield, of the Bakelite Corporation, Bloomfield, N. J., delivered an address on "Synthetic Resins and the Rubber Industry," during which he stressed the point that both phenol-formaldehyde plastics and rubber are allied materials rather than purely competitive products.

Mr. Wakefield mentioned several instances where the synthetic resins replaced rubber and then went on to tell of developments where rubber and resins are being used to form composite structures. He thoroughly reviewed the mutual problems of both industries. Mr. Wakefield showed several samples of products bearing out his statements.

After this address, H. Walter Grote, of the United Carbon Company, performed several of his latest tricks, all of which were well received.

Akron Group Plans Outing

The annual Spring outing of the Akron Group, Rubber Division, A.C.S., will be held on Friday, June 26, at the Silver Lake Country Club. Golf, tennis, fishing and other sports are planned for the afternoon, with prizes to be awarded to the winners of the various contests. Following the dinner, advises Dr. A. E. Warner, of C. P. Hall, secretary-treasurer of the Group, the evening will be spent in good fellowship.

FTC Cites Heel Company

The I.T.S. Company, Elyria, Ohio, together with the National Federation of Master Shoe Rebuilders, of Cleveland, and four individuals, has been charged by the Federal Trade Commission with maintaining a conspiracy resulting in the restraint of trade in the interstate sale of rubber heels and soles. The complaint alleges that I.T.S. and the shoe rebuilding association entered into an agreement and conspiracy to close the natural channels of distribution to wholesalers and manufacturers who sell their products to the Woolworth type of chain store. June 19 is the date set for a hearing at which the respective respondents may show cause why a "cease and desist" order against the alleged practices should not be issued.

National Tire Reopening

The National Tire and Rubber Corporation, of East Palestine, Ohio, which has been idle for many years, and which was recently acquired by new interests, is expected to resume operations in the next few weeks. The factory is being rapidly put into shape for renewed production. According to Joseph Correll, president and general manager, operations will be continued under the same corporate name with approximately 50 persons being initially employed.

United Carbon Golf Trophy

The trophy depicted above has been donated by the United Carbon Company, of Charleston, West Virginia, and will be awarded to the golfer turning in the lowest gross score as a permanent possession in the golf tournament which was scheduled to be held on Saturday, June 13, in connection with the annual outing of the New York Group, Rubber Division, A.C.S., at the Alps Castle, Preakness (Paterson), New Jersey. A complete report of the outing will be presented in the July issue of THE RUBBER AGE.

NEW ENGLAND NEWS

The R. L. Davis Company has started operations in the former New York Insulated Wire Company plant on North Cherry street, Wallingford, Conn., manufacturing an apparatus designed to test wire for the variance of rubber insulation. Ralph Davis, head of the company and designer of the machinery, said orders are on hand and are being filled by a small force at work in the plant. Mr. Davis claims a patent on his apparatus and declares he is investigating alleged infringements.

Goodyear Rubber Company, Middletown, Conn., rubber footwear, has let contracts for construction of an addition to the present vulcanizing room at the Church street plant. The extension will be 11 x 28 feet, one story high, of brick construction, and will cost $2,000. The management and employes of the Goodyear concern won local acclaim in the recent Middletown Community Chest campaign, doubling their contributions of the previous year.

G. M. Williams, president of the Russell Mfg. Company, Middletown, Conn., has announced a centralization plan which will consolidate all departments of the company at the main factory in Middletown. Elimination of the outlying plants is in line with a general modernization program now being carried out by the Russell company, which includes installation of much new manufacturing equipment. President Williams played host to the members of the Russell company Foremen's Club at a dinner at Middlesex Hotel on May 14, with about 80 attending. Secretary C. J. Sherer, T. Macdonough Russell, Jr., and Mr. Williams were among the speakers. Mr. Russell has just been elected a director of the Middletown Chamber of Commerce.

Charles L. Sheldon, of the Hood Rubber Company, Watertown, Mass., attended the annual convention of the National Association of Purchasing Agents at New Orleans, La., May 25 to 28. He is active in Massachusetts purchasing association work.

Nelson W. Pickering, president of the Farrel-Birmingham Company, Inc., Ansonia, Conn., was elected a vice-president of the Connecticut Chamber of Commerce at its annual meeting in Hartford on May 25, succeeding the late James T. Moran of New Haven.

For the fourth consecutive year, employes of the Armstrong Rubber Company, Inc., have enrolled in the 100 Per Cent Club movement to raise funds for the Fresh Air Cottage programs sponsored jointly by the New Haven Family Society and the New Haven *Evening Register*.

Plants of A. G. Spalding & Bros., Chicopee, Mass., which were badly damaged by the March flood, are back on a normal production basis, with more than 1,000 hands employed, according to the latest available report. Production was expected to continue at a good level for some time to come. The company's flood loss on material, stocks, buildings, etc., is estimated at from $75,000 to $100,000.

Rubber Holds Position

A chart prepared by the Foreign Commerce Department of the Chamber of Commerce of the United States reveals that crude rubber was the third important commodity imported into this country in 1935, the same position it held in the previous year. According to the chart, America imported crude rubber valued at $119,082,000 during the year, or 5.8% of total imports. Coffee and cane sugar are the two commodities which lead crude rubber as chief imports.

Goodrich Tire Calculator

B. F. Goodrich Company, Akron, is currently distributing a newly designed tire calculator for 1½ ton trucks which incorporates many improvements over previous calculators issued by the company. The new calculator performs three functions: it shows the probable life of present tire equipment in use, the size tire a truck should use for 100% efficiency, and actual truck tire costs.

Organize Webster Rubber Co.

With R. E. Smith as vice-president in charge of sales, the Webster Rubber Company has been organized at Warren, Ohio. The new company will manufacture camelback and tire repair materials. Mr. Smith has been associated with the rubber industry for 27 years, 17 of them in the retreading and vulcanizing branch, and the last 7 as a special representative of the India Tire Company in charge of repair materials and accessories.

Purchases Wildman Factory

The plant and fixtures of the Wildman Rubber Company, at Bay City, Ohio, have been purchased by the Electric Auto-Lite Company, of Toledo. According to R. C. Martin, Auto-Lite president, the new addition will be overhauled and enlarged. This purchase brings the total number of factories owned by the Toledo firm to more than twenty, including those abroad.

Colombian Rubber Position

Rubber products manufactured in Colombia, South America, according to the Leather and Rubber Division of the Department of Commerce, include rubber heels, canvas rubber-soled shoes and slippers, certain novelties and toys, and small quantities of rubberized cloth and clothing, such as leggings, aprons, automobile tops, tents and sheeting. Rubber heel production, according to Assistant Trade Commissioner J. B. Neathery, at Bogota, is the most important of these groups. The shoe and slipper producers utilize both crude and reclaimed rubber, while the novelties and toy group may be classed as a "cottage industry" wherein only local crude rubber is employed.

LOS ANGELES NEWS

Members of the Los Angeles Rubber Group of the American Chemical Society have chartered two fishing barges with capacity for thirty-four fishermen under date of July 26, the excursion to put in one full day out of San Diego coast waters. Edward L. Royal, heading the fishing committee, announces that two main prizes will be awarded, —a grand prize to the man catching the largest fish and a consolation prize to the man catching the smallest fish. Moving pictures will be taken of the excursion and its catches to be shown later.

With the thought of making the event more complete it has been suggested by the committee and agreed to by a number of the members to drive by automobile with their families and include a visit to the Exposition at San Diego as an additional feature. As the excursion day comes on Sunday, Saturday has been mentioned as the better day for the Exposition visit.

The June event, to occur late in the month, will be a golf tournament. Details of arrangement are the work of H. H. Hummer, of Firestone, chairman of the golf committee. These outdoor summer events take the place of the regular monthly suppers held during the rest of the year.

No summer meetings will be held by California Rubber Manufacturers' Association, according to Charles N. Merralls, president.

The E. M. Smith Company, 637 S. Clarence Street, Los Angeles, has completed the installation of additional equipment and completed a new warehouse, dimensions 60 by 100 feet, one floor, to be used for warehousing raw materials.

A. Schulman, of A. Schulman, Inc., Akron, Ohio, with his wife, has combined pleasure with business on a summer sojourn in southern California. The Schulman firm is represented by B. E. Dougherty of the B. E. Dougherty Company.

CONFERENCE ADOPTS TIRE TRADE RULES

A number of stringent rules for the elimination of abuses and evils existing in the rubber tire industry were adopted at the trade practice conference held in Chicago, on June 4, which was called by petition of the National Association of Independent Tire Dealers to the Federal Trade Commission two months ago. Robert E. Freer, a member of the F.T.C., presided over the conference which was attended by representatives of the tire manufacturers, dealers and other interested parties.

All of the rules adopted at the meeting by majority approval have been sent to the Federal Trade Commission, at Washington, and if approved in turn by that body will be forwarded to each member of the tire industry for individual approval. If a majority of the members of the industry approve them, the rules become laws making them binding on the industry as a whole, violation of which would be a legal infraction.

Fourteen rules in all were adopted at Chicago. If finally approved the following practices would be unethical and illegal: price discrimination between different purchasers, including retail outlets owned by tire manufacturers, where such discrimination lessens competition or tends to create a monopoly; the defamation of competitors by making false representations concerning them; selling goods below the seller's cost; false representations on any product of the industry or life or service of tires or tubes; false or deceptive marking or branding on tires or tubes; and claiming to be "an authorized dealer" when such is not the case.

Other policies which would be considered among unfair trade practices include: the policy of representing a shop as handling "all standard makes" when such is not a fact; offering used tires for sale as new and unused (a practice indulged in by many small mail order concerns); secret rebates; making out invoices or sales tickets which do not accurately state the transaction covered; insufficient marking or branding of tires; and the guarantee of prices for more than thirty days.

A rule was also presented and adopted as part of a code of ethics in the industry which if broken, would not be subject to prosecution. This rule condemns the failure to differentiate between wholesale and retail transactions where the same establishment is engaged in both divisions.

The fourteen rules adopted at the conference, which are conceded an excellent chance of being favored by a majority of the tire industry, and therefore of becoming laws, were substantially the same as those submitted by George J. Burger, secretary and general manager of the recently reorganized National Association of Independent Tire Dealers, when the petition for a trade practice conference was presented to the Federal Trade Commission.

New Goodyear Tires

A new "super" tire has been introduced by the Goodyear Tire and Rubber Company, Akron, as well as a new tire especially designed for farm implements. Known as the Double Eagle Airwheel Tire, the new "super" tire uses different compounds from those used in previous tires, according to Goodyear, and has a wider, thicker and flatter tread. The Goodyear diamond-block center-traction tread design is also slotted 15% deeper than other types to increase non-skid life. Termed the Implement Tire, the second new tire is said to extend to all farm rolling implements the pneumatic tire efficiency that has heretofore been available only to tractors. Advantages claimed for the Implement tire over steel wheels include the following: it rolls freely and requires up to 60% less draw bar pull for a given load; rolls smoothly over rough ground; can travel in soft ground where steel wheels cut and stall; less depreciation; and greater comfort for the operator. The new Goodyear farm tire can be applied to threshers, combines, sprayers, mowers, wagons and other farm machinery towed by tractors.

Canadian Raw Rubber Imports

For the first time in recent years, Canada's principal source of raw rubber imports shifted from the United States to the Straits Settlements in the calendar year 1935. Receipts from the Straits Settlements, according to a recent issue of the Leather and Rubber Division's *News Letter*, comprised 64% of Canada's total imports in comparison with 13% in the previous year. In 1934, the United States furnished 86% of Canada's total imports, with 1935 shipments comprising only 32%. The shift in percentages is accounted for by the reduction and removal of the special excise tax on imports entering Canada under the British preferential tariff or under trade agreements between Canada and British Empire countries.

New Rubber Company

The Howard Rubber Products Company has been formed by M. Howard, at Findlay, Ohio, to manufacture household rubber products. Mr. Howard was formerly vice-president of the Frazier Rubber Products Company, of Carey, Ohio, resigning that post on April 1. The new company is expected to employ between 20 and 25 people when production gets under way shortly.

APRIL CONSUMPTION REACHES 51,897 TONS

Consumption of crude rubber by manufacturers in the United States for the month of April is estimated to be 51,897 long tons, which compares with 42,703 long tons for March. April consumption shows an increase of approximately 21.5% above March, and 17.3% above April a year ago, according to statistics released by the Rubber Manufacturers Association. Consumption for April, 1935, was 44,247 (revised) long tons.

Imports of crude rubber for April are reported to be 40,365 long tons, an increase of 7.8% above the March figure of 37,451 long tons, although 7.3% below the 43,545 long tons imported in April, 1935.

Total domestic stocks of crude rubber on hand April 30 are estimated at 264,178 long tons, which compares with March 31 stocks of 276,823 (revised) long tons and 337,506 (revised) long tons on hand April 30, 1935.

Crude rubber afloat to U. S. ports as of April 30 is estimated to be 47,678 long tons, as compared with 58,935 long tons afloat on March 31 and 37,651 long tons afloat on April 30 a year ago.

April reclaimed rubber consumption is estimated at 10,333 long tons; production, 11,382 long tons; stocks on hand on April 30, 22,274 long tons.

MARCH TIRE SHIPMENTS 20.1% ABOVE FEBRUARY

Shipments of pneumatic casings during the month of March are estimated to be 3,855,970 units, an increase of 20.1% above February although 8.3% below shipments made in March, 1935, according to statistics released by the Rubber Manufacturers Association.

Production of pneumatic casings for March is estimated to be 3,637,969 casings, an increase of 1.7% over February but 16.3% below March, 1935.

Pneumatic casings in the hands of manufacturers, March 31, 1936, are estimated to be 9,087,020 units, a decrease of 1.9% under the stocks on hand February 29, and 22.2% below stocks on hand March 31, 1935.

The actual figures are as follows:

PNEUMATIC CASINGS

	Shipments	*Production*	*Inventory*
Mar., 1936	3,855,970	3,637,969	9,087,020
Feb., 1936	3,211,040	3,577,221	9,264,595
Mar., 1935	4,204,131	4,345,581	11,675,268
Mar., 1934	4,222,962	5,180,122	11,650,662

Incorporate Leader Rubber

Leader Rubber Products Company, of Fremont, Ohio, was incorporated on June 4 in Columbus. Charles A. Patterson, manager, announced that the company, which will issue 250 shares of no par value stock, will engage in the manufacture of molded rubber products of various kinds, including several automotive specialties.

Obituaries

Walter W. Dunfield

Walter W. Dunfield, a member of the staff of the Development Department of U. S. Rubber Products, Inc., at Passaic, N. J., died suddenly at his Fort Lee, N. J., home, on May 9. Forty-five years old, he had apparently been in good health up to the time of his death. Born in Canada, Mr. Dunfield was educated at Clark College. He entered the rubber industry soon after being graduated and served as millroom foreman and compounder for the Bourn Rubber Company, Providence, R. I., from 1915 to 1918. In the latter year he joined the L. Candee Company, a U. S. Rubber subsidiary, in New Haven, Conn. The following year he was transferred to the St. Louis factory, but was retransferred back to New Haven two years later. In 1925 he became a member of U. S. Rubber's Development Department in New York City and moved with that division to Passaic in 1928. Mr. Dunfield had considerable experience in the handling of hose, tank lining, adhesive cements and latex products. He specialized in processes of attaching rubber to metal. His social contacts included membership in the Hiram Lodge F. and A. M. of New Haven, and the James Wood Lodge I.O.O.F., of Providence. At the time of his death he was vice-president of the Fort Lee branch of the Bergen County Sportsmen's Fish and Game Association and secretary of the Fort Lee Independent Republican Club. A widow and five brothers survive.

Isaac Q. Gurnee

Isaac Q. Gurnee, pioneer rubber man, and president of the Superior Hard Rubber Company, Butler, N. J., died at the age of 71 at his home on Myrtle Avenue, in Butler, on May 20, after a long illness during which he had been confined to his bed for several months. Born in 1865 in Parsippany, Morris County, N. J., Mr. Gurnee received his education at the Bloomingdale Academy where he developed an aptitude for mathematics. He left school at the age of 14 and became an office boy for the Rubber Comb and Jewelry Company. In 1898, when the company was reorganized as the American Hard Rubber Company, Mr. Gurnee was placed in full charge as Department Superintendent, later being appointed assistant to William Kiel in the sundries department. He retired from the company in 1919. In 1923 he organized the Superior Hard Rubber Company. In addition to his rubber activities, Mr. Gurnee was the proprietor of the Pequannock Coal and Lumber Company, which he founded in 1903; a director of the First National Bank of Butler, which he helped organize; and was one of the largest stockholders in the Apollo Magneto Corporation of Kingston, N. Y. Funeral services were held on May 23, with interment at Mt. Rest Cemetery, Butler. He leaves a widow, two sons, two brothers, two sisters, and several grand children.

Theodore N. Pockman

Theodore N. Pockman, assistant advertising manager for the U. S. Rubber Company, died on May 13 in the Harkness Pavilion of the Columbia-Presbyterian Medical Center after a long illness. He was 45 years old. For many years he suffered with tuberculosis and spent several seasons in Arizona on a leave of absence in an effort to regain his health. Mr. Pockman was graduated from Rutgers University in 1911, leaving shortly thereafter for Istanbul, Turkey, where he taught for two years at Robert College. Returning to the United States in 1913, he studied journalism at Columbia University. He was assistant editor of the *Importer's Guide* at one time and also served with *Adventure* and *Vanity Fair*. In 1915, while a member of the N. Y. *Herald Tribune*, he represented that newspaper on the Henry Ford Peace Ship expedition. He served as a publicity worker with the Marine Corps during the World War, joining the U. S. Rubber Company at the end of the war. In recent years he lectured on advertising at Columbia University. Mr. Pockman's father is the Rev. Dr. P. Theodore Pockman, former president of the General Synod of the Dutch Reformed Church of America. He leaves a widow, son, daughter, and five sisters.

F. W. Roebling, Jr.

Ferdinand William Roebling, Jr., president of the John A. Roebling Sons Company, Trenton, N. J., died on May 29 in the Harkness Pavilion of the Columbia University-Presbyterian Hospital Medical Center in New York City at the age of 57. On being graduated from Lehigh University in 1901, Mr. Roebling, a nephew of the late Col. Washington A. Roebling, builder of the Brooklyn Bridge, began his industrial career as an engineer in his grandfather's firm. He was appointed assistant secretary and treasurer in 1905, treasurer in 1907, and president in 1926. While still an engineer, Mr. Roebling drew plans for the Williamsburgh Bridge and designed patterns for new machinery for wire-drawing. He was president of the Standard Fire Insurance Company, vice-president of the First Mechanics National Bank of Trenton, and a director of the Chase National Bank, First National Company of Trenton, and the Durable Wire Rope Company. His social activities included membership in the Rumson Country, Carteret, Trenton Country, Spring Lake, Bathing and Tennis, and the Manasquan River Golf and Country clubs. He was also a member of Sigma Phi. In 1925 Mr. Roebling ventured into the newspaper publishing business, purchasing "The State Gazette" of Trenton, the paper being absorbed by the Trenton *Times* a few months after the purchase. Burial was in Ewing Cemetery, Trenton. Surviving are his wife and two sons.

William P. Hayes

William P. Hayes, former secretary and treasurer of the Trenton Rubber Company, died in a Trenton, N. J., hospital on May 23 at the age of 83 from injuries received when hit by a truck several days previous. Born in England, Mr. Hayes came to Trenton when a young man. In addition to his connection with the rubber industry, he also served as warden of the New Jersey State Hospital for some time. At the time of his death he was treasurer of the Trenton Y. M. C. A. and a member of the Masonic fraternity. He was a widower and is survived by a daughter. Burial was in Riverview Cemetery, Trenton.

PEARSON DIES

Just as this issue was going to press, we received a telegram advising of the death on June 10, at Pasadena, California, of Henry C. Pearson, founder and former editor of the *India Rubber World*. Mr. Pearson, who was eighty-eight years old, recently spent several weeks in the Pasadena Hospital as the result of an influenza attack. Details are not available at this writing as to the cause of death.

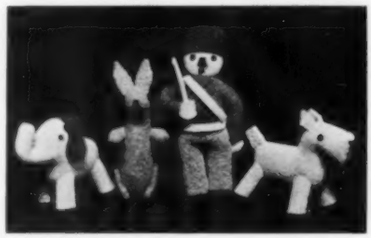
Henry C. Pearson was born at LeRoy, Minn., on February 13, 1858. He received his education in the public schools and entered the business world at the age of 17, joining the Tyer Rubber Company, Andover, Mass. He remained with Tyer for six years, joined the Hayward Rubber Company, Bozrahville, Conn., in 1881, and in 1883 launched upon his career of journalism working with several different newspapers for several years. In 1889 he founded the *India Rubber World* which he edited and published for 37 years, selling his interests to the Bill Brothers Publishing Company in 1926.

Mr. Pearson made several extensive trips into the rubber cultivating countries and authored several well-known books on rubber subjects including "Compounding Ingredients" and "Pneumatic Tires." He was a fellow of both the Royal and National Geographic Societies and a member of both the A.C.S. and A.S.T.M. In the Fall of 1935 he donated his complete library of rubber literature, the effort of 40 years of collection, to the Los Angeles Public Library. He leaves his daughter, Esther, two nephews, and other relatives. Funeral services were to be held at the Turner Stevens Funeral Parlor, in Pasadena, on Saturday, June 13.

New Rubber Goods

Sponge Rubber Novelties

A line of stuffed sponge rubber novelties has been introduced by Mason Bath Toys, 45 East 20th Street, New York City. The novelties are stuffed



with shredded rubber through specially provided holes which are inconspicuously sealed. Dogs, elephants, bunnies, soldiers, Indians and other figures are available.

Ipco Pike Pole Guards

To protect pike pole points, the Industrial Products Company, of Philadelphia, is offering the Ipco Pike Pole Guard. This guard is made entirely of

rubber, is 6 inches long, and has an outside diameter of 1½ inches. When slipped over a pike it extends a safe distance above the point. It can be supplied with a 12-inch length of galvanized chain, as illustrated, if desired.

Sainberg Glasstop Stripping

Replacing the old method of gluing felt stripping, Glasstop Stripping is being featured by Sainberg & Company, Inc., 37 West 26th Street, New York City. This stripping is made with Velvetex, a du Pont rubber composition, with a new process adhesive back. It is non-skid and non-deteriorating, according to Sainberg, with the back of the stripping covered with white Holland cloth which is easily removed when applying the stripping to a desk leaving a tacky finish which adheres firmly to the desk but does not mar it. Glasstop Stripping comes in brown, mahogany or green, and is supplied in rolls of 100 feet.

Portage Cricket and Creeper

Two new lures using rubber in their construction are being made by the Fly Fish Kit Company, Kent, Ohio. One, a water cricket, is new to anglers, its body being of sponge rubber and the legs and feelers of rubber threads, dressed over a shank hook. There are eight rubber threads, each 1½ inches

long by 1/48 to 1/84-inch in width and thickness. The second lure, a creeper, has a body of puffy Chenille with thread rubber legs and feelers. The rubber thread used for legs and feelers on both lures responds to every little movement of the rod and line and produces a natural action, according to W. H. Schumann, creator of both lures.

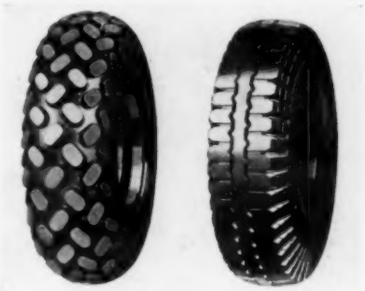
Dayton Rubber Faced Hammer

Black rubber faces are used in a new type of industrial hammer brought out by the Dayton Insulating Molding Company, Dayton, Ohio. The rubber faces are inserted into tapered shanks in a cast iron head machined for the pur-

pose. The rubber insures a maximum blow with a minimum rebound and is perfect for use on polished metal surfaces or any surfaces where a hard blow is required without marring it. It is said to be lower in initial cost than competitive industrial hammers and has the advantage of being replaceable with extra rubber faces. It is equipped with a 14-inch hickory handle.

Two New U. S. Tires

Two new tires, one designed for city delivery operation, the other for farm use, have recently been introduced by



U. S. Rubber Products, Inc. To insure longer wearing qualities in the tire designed for city deliveries, known as the U. S. Royal Fleet-Delivery, an extra deep, flat contour tread is used, this tread averaging 32% greater non-skid depth than standard dimension tires of corresponding size, according to the company. Zig-zag center grooves with sharp edged projections for gripping, and sharp edged cog-wheel shoulder blocks for maximum traction, are other features of the new tire, which also incorporates a wide, center riding rib to insure easy steering. The new Farm Tire has a nobby type tread design and is said to provide 20% more traction than other types. Massive shoulder buttresses add to its tractive ability, according to U. S. engineers, by gripping the soil with gear-like action. Further traction is provided by a large contact area and low air pressure which allow the tread to spread out and "wrap itself around rough ground." The design of the tire makes it self-cleaning.

Goodrich Platform Mat

A new type of rubber matting has been developed by the mechanical goods division of the B. F. Goodrich Company, Akron. It is a perforated mat of the platform type, the top surface consisting of a series of small pyramids instead of being corrugated as in ordinary types. Regardless of the direction of foot traffic, this pyramid design provides an effective scraping surface. The under surface of the platform mat has

a large pebble design which keeps the mat off the floor and permits underneath ventilation and drainage. The new matting is made 3/8-inch thick in

black only and, if desired, may be secured with beveled edges.

Rubber Socket Wrench Holder

A socket wrench holder which consists of a molded rubber composition

base with a separate receptacle for each wrench was recently developed by the Cleveland Universal Jig Company, Cleveland, Ohio. Rubber was selected in preference to other base materials because it is not easily broken and does not mar objects with which it comes in contact. Two sizes are available, the larger accommodating eleven wrenches from 3/32 to 5/8 inch across the flats, designed for general machine shop use, while the smaller, designed for toolmakers' use, holds eight wrenches.

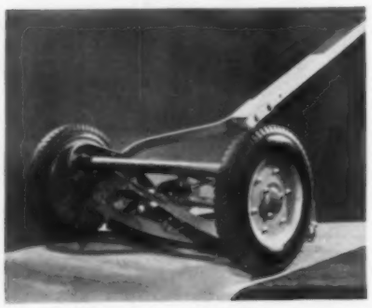
Enbee Cushion Tank Ball

A balloon cushion tank ball, differing in construction from other types on the market, has been introduced by the Enbee Manufacturing Company, 45 Murray Street, New York City. Made in natural color or black rubber, the ball is reversible and fits any size valve from

2 to 3 inches. In cases where the lift wire gets out of alignment, the construction of this ball permits it to adjust itself in the outlet valve. It has a round cushion rim and is said to seal tighter than other types.

Rubber-Tired Yard-Man

Two styles of rubber-tired lawn mowers are being featured by Yard-Man,



Inc., Jackson, Michigan. One model is equipped with a V-belt drive, the other using a gear drive. In the model illustrated, the gear drive Yard-Man, solid tires are fitted over stamped steel rims, the rims being painted and formed to create the illusion of "pneumatic" tires. The tires are especially designed to give maximum traction and smooth operation.

Marathon Rubberized Wader

A new rubberized wader has been introduced by the Marathon Rubber Products Company, Wausau, Wisconsin. It is a hand-made, boot-foot, cleated sole, bumper toe model, made of strong fabric, doubled and vulcanized. All seams of the wader are cemented and strapped with rubber. For hunting and fishing purposes, the wader is made of a

natural marsh grass color. It has a large inside pocket for convenience of the wearer, with draw string and buttons at the top for suspenders.

Rubber-Rimmed Waste Basket

A square steel waste basket with a continuous rubber cushion or binding extending all the way around the four corners and sides (not corners only) has

been announced by the Yawman and Erbe Mfg. Company, Rochester, N. Y. The basket is 11½ inches square inside at the top and is 15 inches high, the top being reinforced with a heavy gauge steel rim. Ribbed corners add to its strength and rigidity as well as improving appearance. Use of the rubber binding protects both the basket and office furniture from damages caused by hitting one against the other.

Delmar Gasoline Pump Hose

Known as the Delmar Type-DB, a new gasoline pump hose is being featured by the Electric Hose and Rubber Company, Wilmington, Delaware, especially resistant to attack by gasoline. The inner tube of this hose is made of a compound based on DuPrene. In outward appearance, the Delmar type is similar to previous de-

signs of gasoline hose, but is said to be 25% lighter in weight. If accidentally deformed it can be restored to shape by the user. Other features include a covering which requires no guard, flexibility, and the inclusion of a static wire.

White Rubber Bicycle Grips

The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J., has introduced white rubber bicycle grips of the new aviator grip style.

MARKETS

RUBBER—COTTON AND FABRICS—CHEMICALS

NEW YORK, JUNE 8, 1936

Crude Rubber

ALTHOUGH crude rubber prices remained at low ebb for the current movement in the middle of May, with spasmodic purchases by rubber factories serving only to force prices higher temporarily, a series of favorable statistical reports, particularly an R.M.A. report revealing that consumption in April reached an all-time monthly high, has resulted in a climbing price for the last few weeks. High for the period was reached today (June 8) when a price of 15.81 for spot was quoted on the Exchange; low for the period was 15.31 quoted on May 11 and 12. Spot jumped 11 points from 11.70 on June 6 to 15.81 on June 8, the following market day, on publication of a Commodity Exchange report revealing that world stocks were appreciably lower. The foreign political and monetary situation continues to be a factor in the market, restricting the price somewhat, although it is a matter of conjecture as to how influential these conditions are. Quotations in the outside market, Exchange, London and Singapore, follow:

As of June 8

Plantations—

Ribbed Smoked Sheets—			
No. 1 Spot	—	@	.15 13/32
July-September	—	@	.16
October-December	—	@	.16 1/16
No. 2	—	@	.15 3/4
No. 3	—	@	.15 1/4
No. 4	—	@	.15 5/8
Thin Latex Crepe	—	@	.16 3/8
Thick Latex Crepe	—	@	.16
Brown Crepe, No. 1	—	@	.15 13/32
Brown Crepe, No. 2	—	@	.15 3/4
Amber Crepe, No. 2	—	@	.15 1/2
Amber Crepe, No. 3	—	@	.15 3/4
Amber Crepe, No. 4	—	@	.15 5/8
Brown Crepe, Rolled	—	@	.15 7/16

Latex—

Liquid Latex, per gal.	.57	@	.58

Paras—

Up-River, fine	—	@	.17 1/2
Acre Bolivian, fine	—	@	.17 3/4

Balata—

Block, Ciudad	—	@	.32

LONDON MARKET

Standard Smoked Sheets—Buyers—June 8

June	—	@	7 3/8d
July-September	—	@	7 3/8d

SINGAPORE MARKET

Standard Smoked Sheets—Sellers—May 9

June	—	@	7 1/4d
July-September	—	@	7 1/16d

Reclaimed Rubber

Business in reclaims was very active last month with reclaimers attributing the increased activity to general business conditions with emphasis on the continued improvement in the automotive and building industries. There have been no changes in prices since our last report. Current quotations follow:

High Tensile

Super-reclaim, black lb.	.08 3/4	@	.09
High Tensile Red lb.	.07 3/4	@	.08

Shoe

Unwashed lb.	.06 1/2	@	.06 3/4
Washed lb.	.08	@	.09

Tube

No. 1 (Floating) lb.	.14	@	.14 1/4
No. 2 (Compounded) lb.	.07 1/4	@	.07 1/2
Red tube lb.	.07 1/4	@	.07 3/4

Tires

Black lb.	.05	@	.05 1/4
Black, selected tires lb.	.05 3/4	@	.05 1/2
Dark Gray lb.	.06 1/2	@	.06 3/4
White lb.	.10	@	.10 1/4
Truck, Heavy Gravity lb.	.05 1/2	@	.06
Truck, Light Gravity lb.	.06	@	.06 1/4

Miscellaneous

Mechanical blends lb.	.03 1/2	@	.04 1/2

Scrap Rubber

(Delivered Akron Mills)

Scrap rubber dealers report a fair amount of trading, with business holding its own. There are sufficient stocks on hand to meet current requirements with a pick-up expected after the usual Summer lull. Prices dropped slightly on clean solid truck tires and boots and shoes. Current quotations follow:

(Prices to Consumers)

Auto tire peelings ton	17.50	@	19.00
Mixed auto ton	8.50	@	10.00
Beadless tires ton	13.50	@	15.00
Clean solid truck tires ton	26.50	@	28.00
Boots and shoes ton	15.00	@	17.50
Arctics, untrimmed ton	12.50	@	15.00
Inner tubes, No. 1 lb.	.09	@	.10
Inner tubes, No. 2 lb.	.04 1/4	@	.04 3/8
Inner tubes, Red lb.	.04 1/4	@	.04 3/8

Cotton

Despite the continued uncertainty of legislation in Washington regulating cotton exchanges, the uncertainty regarding the monetary policies in France, the relatively slow movement of cotton goods and the slowing up in export demands, the cotton market has held steady in the past several weeks, swinging in a 17 point range since our last report. This paradox is explained by the belief of traders that even if favorable weather visits the cotton belt there are still no assurances that the world supply of cotton will be increased, plus the fact that world consumption is continuing at a higher rate. The raising of tariffs during the month resulted in a spurt of buying, as did rumors that cotton mill executives may band together to force curtailment of production. In general, however, the cotton trade expects to return to normal business by early fall, the Government continuing to retire from the market rapidly. Quotations for middling uplands on the New York Cotton Exchange follow:

	May 9	June 8		
	Close	High	Low	Close
July	11.25	11.65	11.60	11.63
October	10.28	10.88	10.79	10.88
December	....	10.84	10.74	10.84

Tire Fabrics

(Prices Net at the Mill)

Peeler, carded, 23/5/3 lb.	.29 1/4	@	.29 3/4
Peeler, carded, 23/4/3 lb.	.30 1/4	@	.30 3/4
Peeler, carded, 15/3/3 lb.	.27 1/4	@	.27 3/4
Peeler, carded, 13/3/3 lb.	.26 1/4	@	.26 3/4
Egyptian, carded, 23/5/3 lb.	.43 1/2	@	.44
Egyptian, combed, 23/5/3 lb.	.48 1/2	@	.49
CHAFERS			
Carded, American, 1 1/16" lb.	.30	@	.32 1/2
Carded, American, 1" lb.	.27 1/2	@	.30
LENO BREAKER			
Carded, American, 1 1/16" lb.	.32	@	.33
Carded, American, 1" lb.	.30	@	.31

Sheetings

48x40	36 in.	5.50 lb.	—	@	.04 1/2
40x40	36 in.	6.15 lb.	—	@	.04 1/2
40x36	36 in.	6.50 lb.	—	@	.03 11/16
48x48	40 in.	2.50 lb.	—	@	.08 5/8
48x48	40 in.	2.85 lb.	—	@	.07 5/8
56x60	40 in.	3.60 lb.	—	@	.07 5/8
48x44	40 in.	3.75 lb.	—	@	.06 5/8
44x40	40 in.	4.25 lb.	—	@	.05 7/8

Ducks

Enameling lb.	.28	@	.32
Belting and Hose lb.	.26 1/4	@	.26 1/2
Single filling, A grade, lb.	.14 3/4	@	—
Double filling lb.	.14 3/4	@	—

Closing Rubber Prices on New York Commodity Exchange, Inc.

No. 1 Standard Contract of 10 tons

FROM MAY 10 TO JUNE 8

Date	Spot	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Sales
May 10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	...
11	15.31	15.23	15.28	15.34	15.38	15.43	15.47	15.51	15.55	15.58	15.61	15.64	15.67	....	37
12	15.31	15.20	15.25	15.31	15.36	15.42	15.45	15.49	15.53	15.56	15.60	15.64	15.68	....	45
13	15.37	15.31	15.36	15.41	15.47	15.53	15.57	15.60	15.63	15.67	15.71	15.75	15.79	....	72
14	15.50	15.45	15.50	15.55	15.60	15.66	15.69	15.72	15.76	15.80	15.84	15.89	15.93	....	129
15	15.68	15.68	15.72	15.76	15.81	15.86	15.88	15.93	15.98	16.02	16.06	16.11	16.15	....	248
16	15.70	15.72	15.77	15.82	15.86	15.91	15.94	15.97	16.01	16.04	16.08	16.12	16.16	....	57
17	....	....	....	....	....	....	....	....	....	....	....	....	....	....	...
18	15.68	15.63	15.68	15.74	15.77	15.82	15.85	15.89	15.92	15.96	15.99	16.03	16.07	....	91
19	15.56	15.53	15.57	15.62	15.66	15.71	15.74	15.77	15.81	15.84	15.87	15.91	15.94	....	74
20	15.68	15.58	15.62	15.67	15.71	15.75	15.78	15.82	15.86	15.90	15.94	15.98	16.02	....	90
21	15.68	15.63	15.64	15.66	15.71	15.77	15.80	15.83	15.87	15.90	15.94	15.98	16.01	....	41
22	15.75	15.74	15.76	15.79	15.82	15.86	15.90	15.94	15.98	16.01	16.04	16.08	16.11	....	45
23	15.68	15.63	15.68	15.73	15.78	15.83	15.86	15.89	15.93	15.96	16.00	16.04	16.07	....	77
24	....	....	....	....	....	....	....	....	....	....	....	....	....	....	...
25	15.68	15.66	15.69	15.72	15.75	15.78	15.82	15.86	15.90	15.93	15.96	16.00	16.03	....	41
26	15.56	15.58	15.60	15.62	15.66	15.70	15.73	15.76	15.80	15.83	15.86	15.90	15.93	....	62
27	15.62	....	15.59	15.62	15.66	15.70	15.73	15.76	15.80	15.83	15.86	15.90	15.93	....	39
28	15.62	....	15.59	15.62	15.67	15.72	15.75	15.78	15.82	15.85	15.88	15.92	15.95	....	104
29	15.62	....	15.58	15.61	15.66	15.71	15.74	15.77	15.81	15.84	15.88	15.92	15.95	....	83
30	....	....	....	....	....	....	....	....	....	....	....	....	....	....	...
31	....	....	....	....	....	....	....	....	....	....	....	....	....	....	...
June 1	15.62	....	15.54	15.58	15.63	15.68	15.73	15.75	15.78	15.81	15.85	15.89	15.92	15.95	25
2	15.62	....	15.54	15.60	15.65	15.71	15.74	15.77	15.80	15.83	15.87	15.91	15.94	15.97	64
3	15.75	....	15.67	15.71	15.75	15.80	15.83	15.87	15.91	15.94	15.97	16.01	16.04	16.07	195
4	15.68	....	15.60	15.64	15.68	15.73	15.75	15.79	15.83	15.86	15.89	15.93	15.97	16.01	62
5	15.70	....	15.63	15.67	15.71	15.76	15.79	15.82	15.86	15.89	15.92	15.96	16.00	16.04	93
6	15.70	....	15.62	15.66	15.71	15.76	15.79	15.82	15.86	15.89	15.92	15.96	16.00	16.04	24
7	....	....	....	....	....	....	....	....	....	....	....	....	....	....	...
8	15.81	....	15.74	15.78	15.83	15.88	15.89	15.93	15.97	16.00	16.04	16.08	16.12	16.16	217

Rubber CHEMICAL Markets

NEW YORK, JUNE 10, 1936

[All Quotations F.O.B. Works Unless Otherwise Noted]

ACCELERATORS

Organic			
A-1 (Thiocarbanilid)	lb.	.21 @	.25
A-5-10	lb.	.33 @	.36
A-7	lb.	.53 @	.65
A-11	lb.	.60 @	.75
A-16	lb.	.55 @	.65
A-19	lb.	.56 @	.75
A-32	lb.	.70 @	.80
A-77	lb.	— @	—
Aldehyde ammonia, crystals	lb.	.65 @	.70
Altax	lb.	— @	—
Captax	lb.		
Crylene	lb.	.55 @	.65
paste	lb.	.45 @	.55
Di-Ortho-Tolyguanidine	lb.	.44 @	.47
Diphenylguanidine	lb.	.35 @	.37
Ethylidene aniline	lb.	.45 @	.47½
Formaldenyde aniline	lb.	.37½ @	.42
Guantal	lb.	.42 @	.51
Heptene	lb.	.40 @	—
Hexamethylene-tetramine	lb.	.37 @	—
Lead Oleate, No. 999	lb.	.11 @	—
Witco	lb.	.11 @	—
Lithex	lb.	.18 @	.20
Methylenedianiline	lb.	.36 @	.37
Monex	lb.	3.25 @	—
Oxynone	lb.	.68 @	.80
Phenex	lb.	.50 @	.55
Pipsolene	lb.	3.55 @	4.00
R & H 40	lb.	.40 @	.41
R & H 50	lb.	.40 @	.41
R-2	lb.	1.55 @	1.90
Safex	lb.	1.20 @	1.25
SPDX	lb.	.75 @	—
Super-Sulphur No. 1	lb.		
No. 2	lb.		
Thiocarbanilid, drums	lb.	.21 @	.25
Trimene	lb.	.75 @	—
base	lb.	1.20 @	—
Triphenylguanidine	lb.	.58 @	.60
Tuads	lb.		
Ureka	lb.	.62 @	1.00
Ureka B	lb.	— @	—
Ureka C	lb.	.58 @	.69
Vulcanex	lb.		
Vulcone	lb.		
Vulcanol	lb.		
Z-88-P	lb.	.48 @	.60
Zimate	lb.		
Inorganic			
Litharge, domestic	lb.	.06½ @	.07
Magnesia, calcined, heavy	lb.	.04 @	—

COLORS

Blacks (See Compounding Materials)

Blues			
Prussian	lb.	.37 @	.39
Ultramarine	lb.	.15 @	—
Browns			
Sienna, Italian	lb.	.06 @	'13
Umber, Turkey	lb	.04 @	.04½
Greens			
Chrome, light	lb.	.20 @	.30
medium	lb.	.21 @	.31
Chromium Oxide, bbl.	lb.	.19 @	.20
Guignet's Green	lb.	.70 @	—
Reds			
Antimony			
crimson, 15/17	lb.	.48 @	—
sulfur, free	lb.	.48 @	.60
Indian English	lb.	.09 @	.10
Domestic (Maroon)	lb.	.11 @	—
Red oxide, pure	lb.	.10 @	.12
Rub-Er-Red, f.o.b. Easton	lb.	.09¼ @	—
Whites			
Cryptone CB, No. 21	lb.	.06 @	.06¼
Cryptone, No. 19	lb.	.06 @	.06¼
Cryptone, ZS-20	lb.	.10½ @	.10¾
Cryptone, ZS-86	lb.	.10½ @	.10¾
Lithopone			
Albalith, black label—11	lb.	.04½ @	.04¾
Azolith	lb.	.04½ @	.04¾
Rayox	lb.		
Titanium oxide	lb.	.17 @	.18½
Titanox B	lb.	.06 @	.06¼
Titanox C	lb.	.06 @	.06¼
Zinc Oxide—American Process			
American Azo:			
ZZZ (lead free)	lb.	.05 @	.05¼
ZZ (leaded)	lb.	.04⅞ @	.05⅛
Anaconda, lead free	lb.	.05 @	.05¼
Horsehead Lead Free Brand:			
Special—3	lb.	.05 @	.05¼
XX Red—4	lb.	.05 @	.05¼
XX Red—72	lb.	.05 @	.05¼
XX Red—78		.05 @	.05¼
XX Red—103	lb.	.05 @	.05¼
U. S. P.—X, bbls.	lb.	.08 @	.08¼
Kadox, black label—15	lb.	.05 @	.05¼
Blue label—16	lb.	.05 @	.05¼
Red label—17	lb.	.05 @	.05¼
St. Joe, black label	lb.	.05 @	.05¼
green label	lb.	.05 @	.05¼
red label	lb.	.05 @	.05¼
Zinc Oxide—French Process			
Florence White seal—7 bbls.	lb.	— @	.06¾
Green seal—8	lb.	.06 @	.06¼
Red seal—9	lb.	.05½ @	.05¾
Yellows			
Chrome	lb.	.11 @	.12
Ocher, dom. med.	lb.	.02¾ @	—

BLACKS

Arrow "Aerfloted" Specification	lb.	.0535 @	.0825
Bone, powdered	lb.	.05½ @	.12½
Carbon, compressed	lb.	.0535 @	.0825
uncompressed	lb.	.0535 @	.0825
"Certified," Cabot	lb.	.0535 @	.0825
Spherons	lb.	.0535 @	.0825
"Disperso"	lb.	.0535 @	.0825
Drop, bbls.	lb.	.05½ @	.14
"Excello," compressed	lb.	.0535 @	.0825
"Fumonex"	lb.	.03 @	.07
"Gastex"	lb.	.03 @	.07
Lampblack	lb.	.07 @	.12
"Micronex"	lb.	.0535 @	.0825
"Supreme"	lb.	.0535 @	.0825
Thermatomic—"P 33"	lb.	— @	—
"Thermax"	lb.	— @	—
United "Dixie" & "Kosmos"	lb.	.0535 @	.0825

COMPOUNDING MATERIALS

Aluminum Flake	ton.	21.85 @	24.50
Ammonia carbonate, lump	lb.	.10½ @	.12
Asbestine	ton	13.00 @	15.00
Barium carbonate (98-100%)	ton	56.50 @	61.50
Barium Dust	lb.	.05 @	.06
Barytes	ton	23.65 @	31.15
Basofor	lb.	.04½ @	—
Bentonite	lb.	.02 @	.03
Blanc fixe dry f.o.b. works	ton	70.00 @	75.00
Calcene	ton	37.50 @	45.00
Catalpo (fact.)	lb.	.02 @	—
Chalk, precipitated			
Suprex white, extra lt.	ton	45.40 @	60.00
heavy	ton	45.00 @	55.00
Clay, Kaolin, domestic	ton	7.50 @	15.00
Aerfloted, Suprex	ton	8.50 @	10.00
Congaree	ton	9.00 @	—
Dixie	ton		
Dixie, Jr.	ton		
McNamee	ton		
Par	ton		
Tensulite		15.00 @	—
Witco	ton	8.50 @	9.00
Cotton Flock	lb.	.11 @	.15
Glues, extra white	lb.	.28 @	.30
medium white	lb.	.14 @	.19
Kalite No. 1	ton	30.00 @	55.00
Kalite No. 3	ton	40.00 @	65.00
Magnesium carbonate	lb.	.08 @	—
Mica	ton	35.00 @	—
Pyrax A	ton	— @	—
Rottenstone (powdered)	lb.	.02½ @	.05
Soapstone, powdered	ton	16.00 @	22.00
Starch, powdered	cwt.	3.19 @	3.39
Talc, domestic	ton	16.00 @	18.00
Whiting, commercial	ton	17.00 @	18.00
Columbia Filler	ton	9.00 @	14.00
English Cliffstone	ton	33.00 @	43.00
Sussex	ton		
Witco	ton	7.00 @	—
Wood Flour	ton	18.00 @	30.00
Zinc Carbonate	lb.	.10½ @	.11
Zinc Stearate	lb.	.26 @	—

MINERAL RUBBER

Black Diamond	ton	27.00 @	—
Genasco, solid (factory)	ton	25.00 @	27.00
Hard Hydrocarbon	ton		
Parmr, solid	ton	31.00 @	—
Pioneer, MR, solid	ton		
Pioneer-granulated	ton		

SPECIALTIES

Aromatics—Rodo	lb.		
Para-Dors No. 5145	lb.	2.00 @	—
Sunproof	lb.	.35 @	.37½
Sponge Paste	lb.	— @	.80
Tonox	lb.	.56 @	.60

SOFTENERS

Acids			
Acetic, 28%, bbls.	100 lb.	2.45 @	2.70
glacial, USP, bbls.	100 lb.	14.00 @	—
Nitric, 36 degrees	cwt.	5.00 @	6.00
Sulfuric, 66 degrees	ton	15.50 @	16.50
Acids, Fatty			
Laurex	lb.	.13 @	.16
Stearex	lb.	.08½ @	.11¾
Stearic, double pressed	lb.	.10 @	.11
Stearite	lb.	.08 @	—
Alkalies			
Caustic Soda, 76%	cwt.	3.60 @	3.75
Soda Ash, 58% C.L.	cwt.	2.52 @	—
Oils			
Corn, refined, bbls.	lb.	.11½ @	.11¾
Cottonseed, crude	gal.	.093 @	.10
Cycline Oil	gal.	.15 @	.28
Degras, bbls.	lb.	.05¼ @	.06¾
Fluxrite	lb.	.05½ @	.06½
Palm Lagos	lb.	.05 @	—
Niger	lb.	.04¾ @	—
Para-Flux	gal.	.17 @	—
Petrolatum, light	lb.	.03⅛ @	.03⅜
Pigmentaroil, tank cars	gal.	.16 @	—
in drums	gal.	.22 @	.23½
Pine, steam distilled	gal.	.64 @	.65
dest. dist., drums	gal.	.44 @	.46
Rosin Oil, cmpd.	gal.	.40 @	—
Rubtack	lb.	.40 @	—
Seedine, c.l.	lb.	.07¾ @	—
Tackol	lb.	.08½ @	.18
Witco Palm Oil	lb.	.05½ @	—
Witco Softener	gal.	.15 @	—
Woburn No. 8, c.l.	lb.	.06 @	—
Wobonite, c.l.	lb.	.05 @	—
Resins and Pitches			
Pitch, Burgundy	lb.	.03½ @	—
coal tar	gal.	.07½ @	.08
hardwood	ton	15.00 @	—
pine, 200 lb. gr. wt.	bbl.	4.00 @	4.50
Rosin, grade K, 280 lb.	bbl.	5.90 @	—
Pigmentar, tank cars	gal.	.19 @	—
in drums	gal.	.25 @	.27
R. S. L. Resin	lb.	— @	—
Retort Pine Tar, drums	bbl.	12.00 @	13.00
Solvents			
Acetone, pure	lb.	.11 @	—
Alcohol, denatured, methanol,			
No. 1 bbls.	gal.	.28 @	.39
Benzene, 90%	gal.	.18 @	.23
Beta-Trichlorethane	gal.	— @	—
Bondogen	lb.	— @	—
Carbon, bisulfide	lb.	.05¼ @	.08
Carbon, tetrachloride	lb.	.05¼ @	.06
Dichlorethylene	lb.	.29 @	—
Dipentene, cml., drums	gal.	.41 @	.44
Dryolene (f.o.b. Okla.)	gal.	.10 @	.10½
Ethylene dichloride	lb.	.05½ @	.06½
Gasoline, steel bbls.	gal.	.16 @	—
Naphtha, solvent	gal.	.31 @	—
Plastogen	lb.		
Reogen	lb.		
Rub-Sol (f.o.b. Okla.)	gal.	.09 @	—
Trichlorethylene		— @	.09½
Turpentine, spirits	gal.	.50 @	—
dest. dist., drums	gal.	.47 @	—
Waxes			
Beeswax, white	lb.	.34 @	.35
Carnauba, yellow	lb.	.45 @	.46½
Ceresin, white, dom.	lb.	.08 @	.11
Montan, crude	lb.	.10¾ @	.11¾
Paraffin (c.l.—f.o.b. N. Y.)			
Yellow crude scale	lb.	.03½ @	—
White crude scale 124/126	lb.	.03 @	—
Refined, 122/127	lb.	.04½ @	—

ANTI-OXIDANTS

AgeRite, Gel	lb.		
HP	lb.		
Powder	lb.		
Resin	lb.		
White	lb.		
Albasan	lb.	.70 @	.75
Antox	lb.		
B-L-E	lb.	.57 @	.60
Flectol-H	lb.	— @	—
Flectol White	lb.	— @	—
Flectol B	lb.	— @	—
Neozone	lb.		
Oxynone	lb.	.66 @	.90
Retardex	lb.	.35 @	.40
Stabilite	lb.	.57 @	.62
Stabilite Alba	lb.	.70 @	.75
VGB	lb.	.55 @	.60

MOLD LUBRICANTS

Aresklene	lb.	— @	—
Cocoa Soapstock	lb.	.06 @	.08
Dipex	lb.	.06 @	.08
Laurex	lb.	.24 @	.30
Rusco, f.o.b. Nitro	lb.	.12 @	.30
Sericite, f.o.b. N. Y.	ton	65.00 @	—
Soap Tree Bark, cut, sifted	lb.	.06 @	.08
Zip (Mold Wash)	lb.	— @	—

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.26 @	—
Black	lb.	.08½ @	—
White	lb.	.08½ @	.13
Brown	lb.	.08 @	.14
Duphax	lb.	.11 @	—

VULCANIZING INGREDIENTS

Sulfur Chloride, yellow (drs.)	lb.	.03½ @	.04½
Sulfur flour,			
Refined, 100% pure (bags)	cwt.	2.55 @	3.15
Commercial (bags)	cwt.	1.60 @	2.35
Tellov	lb.		
Vandex	lb.		

ude Rubber
atex and Guayule
Reclaimed Rubber
Tires and Tubes

STATISTICS OF THE INDUSTRY

Rim Production
Automobiles
Gasoline
Cotton Prices

U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Total Declared Value	Average Declared Value per pound Cents	Re-exports: Long Tons	Total Declared Value	Average Declared Value per pound Cents	Net Imports: Long Tons
1922	301,076	101,843,188	15.10	4,809	1,921,828	17.84	296,267
1923	309,144	185,060,304	26.72	8,772	5,672,319	28.87	300,372
1924	328,056	174,231,331	23.71	10,309	6,057,637	26.23	317,747
1925	396,642	429,705,014	48.36	14,827	19,847,753	59.76	381,815
1926	413,338	505,817,807	54.63	17,671	22,470,583	56.77	395,667
1927	426,258	339,874,774	35.60	27,775	24,735,488	39.76	398,483
1928	439,731	244,854,973	25.03	32,159	18,128,361	25.17	407,572
1929	560,084	239,178,783	19.15	36,485	16,868,733	20.64	523,599
1930	482,082	139,134,330	12.89	30,205	9,316,205	13.77	451,877
1931	497,138	72,918,949	6.54	25,595	4,255,472	7.42	471,543
1932	409,584	31,936,459	3.47	20,929	2,015,612	4.30	388,655
1933	407,817	44,034,064	4.82	20,537	2,601,352	5.65	427,280
1934	449,322	97,898,519	9.73	23,848	5,770,109	11.23	425,615
1935	453,135	115,299,448	11.36	11,389	3,084,331	12.09	441,746
1934:							
June*	47,289	10,747,464	10.14	2,012	501,499	11.33	45,277
July	41,443	9,670,617	10.41	2,366	660,199	13.99	39,077
August	31,531	7,873,690	11.15	1,393	400,433	12.83	30,138
Sept.	31,074	8,293,859	11.92	1,665	474,446	12.72	29,409
Oct.	28,318	8,203,447	12.93	2,058	620,754	13.46	26,260
Nov.	36,325	10,470,076	12.87	1,230	327,672	11.89	35,095
Dec.	17,590	4,974,374	12.62	866	240,780	12.46	16,724
1935:							
Jan.	39,675	10,852,308	12.21	977	278,229	12.72	38,698
Feb.	47,271	12,291,242	11.61	1,845	480,440	11.62	45,426
March	45,350	11,801,152	11.62	1,868	486,379	11.62	43,482
April	39,735	10,096,487	11.34	1,096	285,903	11.64	38,639
May	29,278	7,171,025	10.98	793	202,402	11.39	28,485
June	31,240	7,523,598	10.75	524	153,595	13.10	30,716
July	46,987	11,666,577	11.08	489	132,173	12.06	46,498
August	40,249	10,419,056	11.56	476	130,464	12.23	39,773
Sept.	34,659	8,637,048	11.12	468	120,438	11.48	34,191
Oct.	35,091	8,742,222	11.12	651	188,518	12.92	34,440
Nov.	25,050	6,137,160	10.94	380	101,793	11.95	24,670
Dec.	38,417	9,930,710	11.54	1,821	523,997	12.85	36,596
1936:							
Jan.	32,255	8,624,060	11.94	732	229,129	13.98	31,523
Feb.	32,879	9,293,711	12.62	625	199,956	14.27	32,254
Mar.	34,911	10,271,085	13.13	1,172	390,551	14.88	33,739
April	45,933	14,509,230	14.10	984	343,785	15.59	44,949

* Revised.
Note: Total 1935 figures (revised) subject to further revision.

United States Imports of Guayule, Balata, Jelutong, Liquid Latex

(All Quantities in Long Tons)

	Guayule Tons	Guayule Dollars	Balata Tons	Balata Dollars	Jelutong Tons	Jelutong Dollars	Liquid Latex (1) Tons	Liquid Latex (1) Dollars
1924	1,356	536,392	464	568,456	6,165	1,237,100	2,157	864,059
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	3,853	3,537,810
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	3,388	4,680,386
1927	5,018	2,674,957	582	447,246	7,785	2,448,657	1,116	876,077
1928	3,075	1,755,685	731	430,855	7,552	2,540,059	4,167	2,185,579
1929	1,231	545,175	728	566,964	8,203	2,458,136	3,728	1,787,997
1930	1,096	347,388	501	422,684	5,907	1,403,244	4,449	1,506,804
1931	—	—	1,208	411,692	5,777	1,019,010	4,650	884,355
1932	—	—	708	147,403	4,607	616,596	5,085	601,999
1933	—	—	1,658	2,261,869	5,989	944,895	11,085	1,833,671
1934	402	75,349	1,054	438,209	4,988	943,752	13,070	3,633,253
1935	468	86,835	626	188,384	5,747	1,063,126	13,553	3,782,222
1935:								
April	—	—	51	11,452	419	58,429	1,721	415,100
May	51	9,464	62	12,931	332	51,805	1,427	380,844
June	105	19,502	75	23,809	330	50,165	591	152,665
July	51	9,800	49	15,758	388	62,736	1,144	303,518
August	50	9,464	31	8,963	445	82,179	1,234	370,431
Sept.	18	3,245	29	6,090	1,682	407,418	1,048	291,652
Oct.	48	8,112	27	7,641	208	33,262	1,287	342,101
Nov.	70	11,931	39	11,706	269	50,657	1,023	261,668
Dec.	91	15,317	62	18,269	414	71,885	1,395	391,386
1936:								
Jan.	70	13,182	30	8,924	656	133,948	1,667	474,682
Feb.	75	14,127	100	34,389	396	84,635	1,459	406,985
Mar.	40	7,605	65	25,590	378	70,560	1,427	417,704
April	103	19,469	38	15,232	751	146,548	1,612	522,049

(1) Weight given in pounds of dry rubber contained in latex.
Note: Total 1935 figures (revised) subject to further revision.

U. S. Consumption of Crude Rubber

(Rubber Manufacturers' Association statistics raised to 100 per cent—All figures in long tons)
(All Quantities in Long Tons)

	Figures on Monthly Basis: 1929	1930	1931	1932	1933	1934	1935	1936
Jan.	43,002	36,194	28,557	29,648	22,645*	39,190*	47,103	48,506
Feb.	41,594	33,302	28,797	31,821	21,392*	40,515*	43,187	36,746
Mar.	44,730	35,540	32,788	29,505	17,483*	47,003*	42,620	42,703
Apr.	47,521	39,686	33,321	27,518	25,928	44,853*	44,247*	51,897
May	49,233	39,386	37,817	30,957	44,074	42,918*	41,568	
June	43,227	34,195	37,916	41,475	50,743*	40,147*	36,623	
July	41,526	29,508	31,397	29,976	49,614*	32,553*	36,384	
Aug.	38,274	30,850	27,586	23,721	44,428*	33,216*	39,242	
Sept.	34,707	25,515	23,638	23,847	35,281*	30,258*	37,553	
Oct.	34,800	27,516	22,277	22,286	31,543*	31,253*	42,436	
Nov.	27,659	23,691	22,943	23,231	28,831*	34,748*	42,778	
Dec.	25,531	21,687	21,409	18,015	28,757*	36,569*	42,942	
Tot.	469,804	375,980	348,986	332,000	400,719*	453,223*	496,683*	

* Revised.

Reclaimed Rubber in the United States

(All Quantities in Long Tons)

Year	Production	Consumption	% to Crude	Stocks*	Year	Production	Consumption	% to Crude	Stocks*
1926	180,582	164,500	45.9	23,213	1931	133,351	124,126	33.9	19,257
1927	189,144	178,471	47.6	24,980	1932	75,608	77,504	23.4	16,354
1928	208,516	223,000	50.4	24,785	1933	99,560	81,602	19.9	20,746
1929	218,954	226,588	48.4	27,464	1934	110,010	100,597	22.2	23,079
1930	157,967	153,497	40.8	22,006	1935	122,948	112,712	22.7	25,069

Figures on Monthly Basis								
1935:								
Jan.	10,465	11,261	23.9	22,291	July	8,421	8,396	23.1	17,810
Feb.	10,072	9,374	23.3	22,989	Aug.	9,557	8,795	22.4	18,272
Mar.	10,549	9,741	22.9	20,637	Sept.	9,041	8,764	23.4	18,260
Apr.	10,315	10,466	23.4	18,716 a	Oct.	11,926	9,662	22.8	19,640
May	10,223	9,938	23.9	18,541	Nov.	11,482	9,084	21.2	21,478
June	8,590	8,710	23.8	17,932	Dec.	12,307	8,521	19.8	25,069
1936:								
Jan.	11,665	10,039	20.7	26,145	July	.....	.....	...	.....
Feb.	10,188	7,366	20.1	28,267	Aug.	.....	.....	...	.....
Mar.	10,712	8,767	20.5	29,161	Sept.	.....	.....	...	.....
April	11,382	10,333	19.9	22,274	Oct.	.....	.....	...	.....
May	.....	.....	...	.....	Nov.	.....	.....	...	.....
June	.....	.....	...	.....	Dec.	.....	.....	...	.....

* Stocks on hand at the end of month or year.
a Revised.

U. S. Consumption of Gasoline

(Bureau of Mines Statistics)
(In Thousands of Barrels of 42 Gallons)

	1934*	1935*	1936		1934*	1935*	1936
January	29,489	28,062	32,553	August	39,105	42,836	
February	25,310	26,432	27,401	September	34,669	37,862	
March	30,577	31,997	35,871	October	37,674	41,401	
April	32,736	36,082	38,825	November	34,998	35,956	
May	38,071	39,095		December	30,581	33,734	
June	36,430	37,890					
July	37,466	41,209		Total	407,106	432,556	

* Revised on basis of final annual figures issued by Bureau of Mines.

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total		Total		Total
1924	21,863,311	1928	24,247,282	1932	6,261,336
1925	26,001,664	1929	24,141,502	1933	8,713,962
1926	24,199,524	1930	17,364,096	1934	12,255,118
1927	19,700,003	1931	11,253,800	1935	18,664,356

1936:		1936:		1936:	
January ...	1,877,448	May	1,959,425	September ..	.....
February ..	1,260,590	June	.....	October ...	.....
March	1,840,723	July	.....	November ..	.....
April	2,258,296	August	.....	December ..	.....

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
1934																																
February	.10	9⅞	9⅛	—	10¼	10⅛	10⅛	10⅛	10⅜	10⅛	—	—	10⅜	10⅞	10⅝	10⅜	10⅛	—	10½	10⅜	10⅜	—	10⅜	10⅜	—	10⅞	10⅜	—	—	—	—	10½
March	.10⅞	10½	—	—	10⅜	10⅜	10⅜	10⅜	10⅛	10⅛	11⅛	11⅝	11⅛	11⅛	11⅜	11⅜	11⅛	10⅜	10⅝	11⅛	10⅞	11⅛	10⅞	11⅛	10⅞	10⅞	10⅞	10⅜	11⅛	—	—	11
April	.11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅝	11⅝	11⅛	11⅛	11⅝	11⅝	12	12⅛	12⅛	12⅜	12⅜	12⅜	12⅜	12⅜	12⅜	12⅜	12½	12⅜	12⅜	12⅜	12⅜	12⅜	12⅜	—	—	12⅜
May	.14⅜	14⅜	14⅜	15	15⅛	15⅛	15⅛	15⅜	14	13⅞	13⅞	13⅞	13⅞	13⅞	13⅞	13⅞	13⅞	13⅞	13⅞	13⅞	13⅞	13⅞	13⅞	13⅞	13⅞	13⅞	13⅞	13⅞	13⅞	13⅞	13⅞	13⅞
June	.13	13	12⅝	12⅜	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛
July	.14⅛	14	14⅜	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
August	.14⅛	14⅜	15	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜
September	.14⅜	14⅜	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
October	.14⅜	13⅜	13⅜	14	13	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜
November	.13⅜	13⅜	13	13	13	13⅜	13⅜	13⅜	14	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜
December	.13⅜	—	12⅜	13	13	13⅜	13⅜	—	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜
1935																																
January		13½	13½	13½	13½	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	—	13⅜	12⅞	13	12⅞	13⅛	—	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛	13⅛
February		13⅜	—	12⅜	12⅜	12⅜	12⅜	12⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜
March		11⅜	11⅜	11⅜	11⅜	12	12	12⅛	12	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝
April		11½	11⅛	11½	11	11	11⅛	11⅝	11⅝	11⅝	11⅝	11⅝	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛
May		12⅛	12⅛	12⅛	12½	12½	12⅛	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝
June		12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝
July		12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝
August		12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝
September		11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜
October		11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜
November		13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜
December		13⅜	12⅜	12⅜	12⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜
1936																																
January		13½	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜
February		15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
March		15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝
April		15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
May		15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
June		15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Market)

Average Price per Pound for Years 1910-1929

Year	Cents	Year	Cents	Year	Cents	Year	Cents	Year	Cents
1910	206.60	1914	65.33	1918	60.15	1922	17.50	1926	48.50
1911	141.30	1915	65.85	1919	48.70	1923	29.45	1927	37.72
1912	121.60	1916	72.50	1920	36.30	1924	26.20	1928	22.48
1913	82.04	1917	72.23	1921	16.36	1925	72.46	1929	20.55

Average Monthly Price per Pound Since 1930

	1930 Cents	1931 Cents	1932 Cents	1933 Cents	1934 Cents	1935 Cents	1936 Cents
Jan.	15.24	8.34	4.38	3.08	9.32	13.10	14.35
Feb.	15.85	7.70	4.03	2.95	10.45	12.92	15.48
Mar.	15.34	7.71	3.35	3.01	11.01	11.51	15.89
Apr.	14.93	6.43	3.02	3.56	12.10	11.55	15.98
May	14.24	6.49	3.09	4.95	13.26	12.05	15.62
June	12.45	6.35	2.66	6.15	13.51	12.57	
July	11.24	6.37	2.89	8.01	14.60	12.10	
Aug.	9.96	5.38	3.63	7.31	15.47	11.98	
Sept.	8.28	5.08	3.84	7.30	15.36	11.55	
Oct.	8.20	4.87	3.65	7.64	13.96	12.62	
Nov.	9.01	4.65	3.44	8.66	13.04	13.15	
Dec.	9.05	4.64	3.24	8.87	12.98	13.28	
Average for Year	11.98	6.17	3.49	5.96	12.92	12.37	

London Closing Prices of Ribbed Smoked Sheets

(In Pence Per Pound)

Day	1936 Mar.	1936 Apr.	1936 May	1936 June	Day	1936 Mar.	1936 Apr.	1936 May	1936 June
1	—	7 3/8	7 1/16	—	17	7 1/16	7 1/16	—	
2	7 3/8	7 1/16	7 1/2	7 1/4	18	7 1/16	7 1/16	7 3/8	
3	7 3/8	7 1/2	—	7 1/4	19	7 1/16	—	7 3/8	
4	7 3/8	7 1/2	7 3/8	7 1/16	20	7 1/16	7 3/8	7 1/16	
5	7 1/16	—	7 3/8	7 1/4	21	7 1/16	7 1/16	7 1/16	
6	7 1/2	7 1/2	7 3/8	7 1/4	22	—	7 1/2	7 1/16	
7	7 1/2	7 1/2	7 1/4	—	23	7 1/2	7 1/16	7 3/8	
8	—	7 1/16	7 1/4	7 3/8	24	7 1/2	7 1/2	—	
9	7 1/16	7 1/16	7 1/4		25	7 1/16	7 1/16	7 3/8	
10	7 1/2	—	—		26	7 1/16	—	7 1/16	
11	7 1/2	—	7 1/4		27	7 1/16	7 1/2	7 1/4	
12	7 1/16	—	7 1/4		28	7 1/16	7 3/8	7 1/16	
13	7 3/8	—	7 1/4		29	—	7 1/2	7 1/16	
14	7 1/16	7 1/16	7 3/8		30	7 1/16	7 1/16	—	
15	—	7 1/16	7 3/8		31	7 1/16	—	—	
16	7 1/16	7 3/8	7 1/16						

Average Monthly Price Per Pound

Month	1933 Pence	1934 Pence	1935 Pence	1936 Pence	Month	1933 Pence	1934 Pence	1935 Pence	1936 Pence
Jan.	2.264	4.429	6.434	6.758	Aug.	3.811	7.401	5.696	
Feb.	2.093	4.920	6.292	7.255	Sept.	3.728	7.409	5.508	
Mar.	2.099	5.136	5.745	7.450	Oct.	3.957	6.806	6.130	
Apr.	2.323	5.712	5.604	7.502	Nov.	4.096	6.294	6.308	
May	2.966	6.207	5.822	7.335	Dec.	4.200	6.295	6.340	
June	3.392	6.245	6.027		Average for Year	3.233	6.159	5.976	
July	3.860	7.053	5.801						

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Date	1936 Apr.	1936 May	1936 June	Date	1936 Apr.	1936 May	1936 June	Date	1936 Apr.	1936 May	1936 June
1	11.56	11.61	11.79	11	11.69	11.63		22	11.85	11.69	
2	11.69	11.61	11.80	12	——	11.63		23	11.88	11.74	
3	11.62	——	11.80	13	11.75	11.63		24	11.80	——	
4	11.60	11.62	11.77	14	11.74	11.66		25	11.83	11.72	
5	——	11.62	11.80	15	11.72	11.73		26	——	11.73	
6	11.56	11.63	11.78	16	11.73	11.72		27	11.77	11.74	
7	11.64	11.65	——	17	11.74	——		28	11.69	11.76	
8	11.70	11.67	11.78	18	11.81	11.72		29	11.60	11.77	
9	11.69	11.65		19	——	11.72		30	11.55	——	
10	——	——		20	11.77	11.72		31	——	——	
				21	11.79	11.72					

Average Monthly Price Per Pound

	1933 Cents	1934 Cents	1935 Cents	1936 Cents		1933 Cents	1934 Cents	1935 Cents	1936 Cents
Jan.	6.23	11.25	12.70	11.91	Aug.	9.55	13.40	11.48	
Feb.	6.05	12.28	12 58	11.53	Sept.	9.64	13.00	10.80	
Mar.	6.39	12.30	11.63	11.43	Oct.	9.58	12.48	11.28	
Apr.	7.02	11.80	11.73	11.71	Nov.	10.04	12.53	12.01	
May	8.64	11.44	12.25	11.68	Dec.	10.17	12.76	11.99	
June	9.47	12.20	11.89		Average for Year	8.63	12.36	11.88	
July	10.76	12.84	12.26						

World Stocks of Crude Rubber

(All figures are in long tons)

ON HAND OR AFLOAT TO THE U. S.

At End of	ON HAND 1934	ON HAND 1935	ON HAND 1936	AFLOAT 1934	AFLOAT 1935	AFLOAT 1936	ON HAND AND AFLOAT 1934	ON HAND AND AFLOAT 1935	ON HAND AND AFLOAT 1936
Jan.	368,660	348,931*	276,372	45,768	42,066	43,870	414,428	390,997*	320,242
Feb.	358,681*	339,335*	273,284	53,063	42,969	46,532	411,744*	382,304	319,816
Mar.	352,897*	338,700	276,823*	54,722	44,485	58,935	407,619*	383,185	335,758*
Apr.	351,073*	337,506	264,178	56,251	37,651	47,678	407,324*	375,157*	311,856
May	350,935*	319,281		57,921	44,375		409,250	363,656	
June	358,461*	320,470		46,698	55,581		404,847	376,051	
July	365,072	330,528		45,869	49,018		410,941	379,546	
Aug.	363,711*	329,548		40,278	47,724		403,989*	377,272	
Sept.	360,623*	326,236		38,831	43,413		399,454	369,649	
Oct.	362,571*	317,850		38,247	49,913		400,818*	367,763	
Nov.	362,826*	303,162		38,625	46,588		401,451*	349,750	
Dec.	355,000*	295,438		47,644	39,094		402,644*	334,532	

(Rubber Manufacturers' Association figures raised to 100%)

* Revised.

STOCKS IN GREAT BRITAIN

(No. of Tons in Wharves and Warehouses, not including Latex)

At end of	London 1934	London 1935	London 1936	Liverpool 1934	Liverpool 1935	Liverpool 1936
January	38,570	81,807	84,791	51,702	66,405	77,188
February	38,752	87,605	79,757	52,730	67,983	77,138
March	40,501	92,664	74,779	53,813	69,218	72,823
April	42,413	94,361	68,932	53,695	70,584	71,388
May	42,190	95,722		54,007	71,927	
June	45,674	98,077		54,028	73,131	
July	50,490	99,226		55,414	74,915	
August	48,953	101,574		56,246	75,584	
September	56,103	101,198		56,848	76,263	
October	63,079	94,749		57,818	76,400	
November	67,656	90,542		60,106	76,301	
December	72,285	86,551		62,505	77,589	

(Figures from the Rubber Trade Association of London)

STOCKS IN OTHER CENTRES

(Figures from Statistical Bulletin of the Int'l Rubber Regulation Committee)

At end of 1935	Penang and Singapore [1]	Malaya [2]	Ceylon [3]	Holland	Para and Manaos
May	54,740	36,605	4,647	1,499	4,222
June	51,770	38,209	4,271	1,481	4,036
July	49,958	39,140	4,700	1,448	4,441
August	46,482	34,541	4,866	1,455	4,571
September	33,872	33,489	4,403	1,442	4,673
October	37,597	34,271	3,790	1,440	4,346
November	32,597	34,197	4,393	1,550	4,062
December	28,304	33,899*	4,794	1,553	4,683
At end of 1936					
January	31,195	35,231*	4,504*	1,568	4,496
February	38,421	34,109	4,475	1,532	6,199
March	29,322	31,723	3,866	1,547	4,864

[1] Dealers' and Port Stocks. [2] Inside Regulated Areas. [3] Dealers' Stocks Only.
* Revised.

RUBBER STOCKS AFLOAT

End of: 1935	Afloat for United States	Afloat for Europe	All Other * Afloat	Total * Afloat
April	37,651	31,400	29,949	99,000
May	44,375	30,300	29,325	104,000
June	55,581	27,485	17,934	101,000
July	49,018	29,150	17,832	96,000
August	47,724	32,800	21,476	102,000
September	43,413	31,090	26,497	101,000
October	49,913	29,000	20,087	99,000
November	46,588	26,250	16,162	89,000
December	39,094	25,200	18,706	83,000
End of 1936:				
January	43,870	20,160	19,970	84,000
February	46,532	20,000 P	18,468	85,000
March	58,935	18,000	11,065	88,000
April	47,678			

* *Total Afloat* is an arbitrary estimate based on 1½ months' shipments as adopted by the Department of Commerce. *All Other Afloat* is determined by subtracting the amount of stocks in transit to the United States and Europe from the estimated total.
P—Preliminary estimate

TOTAL WORLD STOCKS

(Figures from the Survey of Current Business)

At end of	1931	1932	1933	1934	1935	1936
January	510,296	638,416	634,797	661,948	698,153	600,479*
February	516,123	626,819	626,227	663,308	686,195	599,355*
March	532,080	629,894	638,428	666,382	678,809	573,000
March	532,080	629,894	638,428	666,382	678,809	
April	531,832	630,803	629,159	658,796	677,006	
May	528,855	627,474	626,537	689,239	677,569	
June	533,021	595,712	613,055	672,804	671,525	
July	548,794	589,037	618,258	676,200	679,061	
August	555,931	597,274	617,449	674,702	680,644	
September	561,838	599,986	623,683	694,361	661,509	
October	588,873	609,368	636,597	680,616	655,000	
November	605,684	614,342	642,968	684,408	623,300	
December	628,826	629,898	654,890	705,975	611,987*	
Monthly Average.	553,513	615,752	630,171	677,395	666,729*	

* Revised.

U. S. Tire and Tube Statistics[1]

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Figures for Recent Years

	1928	1929	1930	1931	1932	1933	1934	1935
Production	77,944	68,726	50,965	48,739	40,085	45,304	47,233	49,362
Shipments	74,296	69,395	53,638	48,151	40,260	44,094	46,687	50,357
Inventory [2]	13,624	11,838	9,003	7,775	7,644	8,888	9,455	8,196

Figures for Recent Months

	PRODUCTION 1934	PRODUCTION 1935	PRODUCTION 1936	SHIPMENTS 1934	SHIPMENTS 1935	SHIPMENTS 1936	INVENTORY 1934	INVENTORY 1935	INVENTORY 1936
Jan.	3,922	4,626	4,579	3,222	3,663	3,875	9,684	10,398	8,918
Feb.	4,335	4,383	3,577	3,285	3,287	3,211	10,725	11,530	9,265
Mar.	5,180	4,346	3,638	4,223	4,204	3,856	11,651	11,675	9,087
Apr.	4,470	4,512		4,438	5,144		11,981	11,003	
May	4,456	4,175		5,332	4,067		11,127	11,131	
June	4,342	3,910		5,228	4,262		10,219	10,755	
July	3,353	3,532		4,157	5,447		9,437	8,850	
Aug.	3,533	3,993		4,308	4,739		8,697	7,805	
Sept.	2,936	3,787		3,183	3,303		8,419	8,288	
Oct.	3,287	4,051		3,010	4,095		8,657	8,291	
Nov.	3,341	3,997		3,191	3,990		8,779	8,249	
Dec.	3,778	4,051		3,109	4,154		9,455	8,196	

AUTOMOBILE INNER TUBES

Figures for Recent Years

	1928	1929	1930	1931	1932	1933	1934	1935
Production	80,180	68,829	52,420	48,333	36,891	42,546	46,228	47,879
Shipments	77,127	70,592	54,938	50,021	37,911	41,391	45,046	48,241
Inventory [2]	16,117	12,807	9,999	7,922	6,749	7,815	9,180	8,231

Figures for Recent Months

	PRODUCTION 1934	PRODUCTION 1935	PRODUCTION 1936	SHIPMENTS 1934	SHIPMENTS 1935	SHIPMENTS 1936	INVENTORY 1934	INVENTORY 1935	INVENTORY 1936
Jan.	3,530	4,259	4,734	3,199	3,722	4,297	8,403	9,621	8,889
Feb.	4,077	4,171	3,666	3,323	3,362	3,552	8,445	10,466	8,968
Mar.	5,194	4,123	3,904	4,118	4,168	3,913	10,244	10,406	8,960
Apr.	4,735	4,259		4,342	4,453		10,585	10,170	
May	4,359	3,892		4,902	3,451		10,043	10,615	
June	4,097	3,480		5,309	4,024		8,795	10,050	
July	3,531	3,251		4,323	5,269		8,053	8,005	
Aug.	3,680	3,894		4,198	4,556		7,555	6,939	
Sept.	3,110	4,125		3,024	3,426		7,639	7,565	
Oct.	3,219	4,435		2,689	4,110*		8,151	8,053	
Nov.	3,169	3,942		2,767	3,801*		8,503	8,161	
Dec.	3,503	4,048		2,850	4,084*		9,180	8,231	

(1) Rubber Manufacturers' Association figures, raised to 100%. The Association estimates its figures to be 75% complete up until 1929 and 80% complete for 1929-1933. Beginning 1934, the Association reported its figures to be 97% complete.
(2) Held by manufacturers at end of period indicated.
(*) Revised.

Automobile Production

	United States Total	United States Passenger Cars	United States Trucks	Canada Total	Canada Passenger Cars	Canada Trucks	Grand Total
1928	4,357,384	3,826,613	530,771	242,382	196,737	45,645	4,599,944
1929	5,358,420	4,587,400	771,020	263,295	207,498	55,797	5,621,715
1930	3,355,986	2,814,452	540,534	154,192	125,442	28,750	3,510,178
1931	2,389,730	1,973,090	416,640	82,621	63,477	19,144	2,472,351
1932	1,370,678	1,135,493	235,187	60,816	50,718	10,098	1,431,494
1933*	1,920,057	1,573,512	346,545	65,924	53,855	12,069	1,992,126
1934*	2,753,111	2,177,919	575,192	116,852	92,647	24,205	2,869,963
1935	4,009,496	3,285,836	723,660	172,995	139,742	33,253	4,182,491
1935 [1]							
April	477,691	401,628	76,063	24,121	20,686	3,435	501,812
May	364,662	307,522	57,140	20,765	17,093	3,672	385,427
June	361,248	296,609	64,639	15,745	12,276	3,469	376,993
July	336,985	276,084	60,901	13,069	9,471	3,598	350,054
Aug.	239,994	182,389	57,605	7,692	5,524	2,168	247,686
Sept.	89,804	57,285	32,519	5,323	3,819	1,504	95,127
Oct.	275,024	214,609	60,415	8,313	7,128	1,185	283,337
Nov.	398,039	338,425	59,614	13,496	12,042	1,454	411,535
Dec.	407,804	344,613	63,191	13,775	11,370	2,405	421,579
1936							
Jan.*	364,004	298,274	65,730	13,302	11,261	2,041	377,306
Feb.*	287,606	224,816	62,790	13,268	10,853	2,415	300,874
March*	420,971	343,523	77,448	17,974	14,488	3,486	438,945
April	502,775	417,133	85,642	24,951	20,247	4,704	527,726

* Revised.
[1] Figures for the complete period of 1935 were revised by the Bureau of the Census, Department of Commerce, on January 24, 1936.

ADVERTISING PAGES REMOVED

Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

	BRITISH MALAYA [1]							DUTCH EAST INDIES [5]							
	Gross Exports	Imports	Gross Exports Minus Imports	Ceylon [2]	India & Burma [3]	Sarawak [4]	British North Borneo [3]	Siam [4]	Java & Madura	Sumatra E. Coast	Other D.E.I.	Indo-China [3]	Amazon Valley	All Other [6]	World Total [7]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	37,822	5,067	16,765	7,856	406,415
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	514,487
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,530
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,582	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,848	82,511	121,770	9,548	21,129	10,690	653,794
1929	574,836	163,092	411,744	81,584	11,663	11,077	7,381	5,018	65,990	87,789	134,037	9,696	21,148	6,767	853,894
1930	547,043	133,876	413,167	76,970	10,782	10,309	6,781	4,251	69,755	79,396	115,254	7,665	14,260	5,651	814,241
1931	519,740	125,506	394,234	61,769	8,470	10,451	6,247	4,218	75,952	87,747	116,009	11,696	12,121	3,292	792,203
1932	478,252	92,539	385,713	48,973	3,888	6,960	4,664	3,451	61,312	79,837	85,871	13,883	6,450	1,816	702,818
1933	573,412	167,377	406,035	63,351	4,527	10,874	7,555	7,765	73,851	91,861	149,659	18,394	9,883	2,737	846,312
1934	677,361	211,803	465,558	79,746	10,492	17,233	11,103	17,545	87,400	112,058	175,470	20,170	8,903	2,985	1,008,663
1935	590,522	176,705	413,817	53,584	13,134	20,850	8,868	28,051	57,479	78,362	135,247	29,949	11,125	5,055	856,245
1934:															
Feb.	57,867	15,027	42,840	8,620	775	1,005	805	1,264	6,706	9,211	13,696	1,232	831	105	87,090
March	58,515	19,907	38,608	6,750	1,412	1,360	806	1,363	8,655	10,539	19,084	1,968	846	113	91,504
April	56,748	20,957	35,791	5,157	762	1,447	894	1,311	7,282	9,808	19,250	1,330	440	236	83,708
May	69,403	25,691	43,712	8,870	1,106	1,892	1,397	997	12,104	14,606	26,598	1,243	726	328	113,579
June	53,282	20,981	32,301	5,397	1,425	1,886	644	1,497	4,860	6,192	15,956	1,593	765	377	72,893
July	53,335	22,829	30,506	3,818	710	1,662	1,048	2,399	5,762	7,369	14,415	1,703	353	252	69,997
Aug.	52,641	17,865	34,776	4,948	552	1,714	1,048	1,908	5,340	8,901	11,356	1,610	710	251	73,114
Sept.	61,051	17,889	43,162	6,555	294	1,438	839	1,626	5,722	10,738	14,688	1,665	764	222	87,713
Oct.	47,045	10,226	36,819	6,544	413	1,412	1,196	1,328	5,970	6,643	5,556	1,413	840	401	68,535
Nov.	51,140	8,759	42,381	6,756	501	953	941	1,356	7,621	7,123	5,338	2,356	1,017	334	76,676
Dec.	59,575	15,375	44,200	8,481	990	1,237	680	2,043	10,865	12,953	12,354	2,956	1,035	239	98,033
1935															
Jan.	56,720	17,142	39,578	5,202	2,269	1,630	1,222	2,614	3,812	5,371	8,704	2,650	1,196	460	74,719
Feb.	50,593	17,676	32,917	5,556	731	1,887	760	2,288	4,395	7,663	15,194	2,076	636	254	74,154
Mar.	47,407	13,437	33,970	3,181	701	1,901	773	2,076	5,592	7,950	7,973	1,472	740	526	66,855
Apr.	53,360	16,029	37,331	2,976	370	1,895	846	1,661	5,574	6,873	12,683	2,827	963	185	74,957
May	51,353	23,720	27,633	4,223	674	2,323	848	2,752	6,217	7,931	21,058	2,138	832	315	76,920
June	49,751	18,637	31,114	3,525	1,077	2,031	603	2,869	5,698	8,258	14,168	2,021	659	393	72,416
July	48,975	11,257	37,718	4,106	580	1,870	1,164	1,939	5,899	5,664	8,373	2,015	427	407	70,162
Aug.	51,873	10,978	40,895	5,683	724	759	566	2,062	4,661	6,923	8,875	2,451	1,150	442	74,541
Sept.	51,247	10,418	40,829	3,970	681	1,797	421	2,278	4,089	5,862	9,422	2,248	1,017	493	73,107
Oct.	48,258	19,364	28,894	5,932	1,198	2,168	1,040	2,622	3,937	6,698	16,432	2,748	1,240	462	73,371
Nov.	43,147	10,518	32,629	4,288	1,806	1,356	455	2,155	3,724	3,963	8,511	2,392	936	587	62,802
Dec.	37,838	7,529	30,309	4,942	2,323	1,233	171	2,735	3,881	5,206	3,854	4,911	1,329	531	61,425
1936:															
Jan.	39,101	12,582	26,519	4,131	1,006	2,385	938	1,665	4,315	6,347	9,270	2,449	1,756	500	61,281
Feb.	38,436	18,857	19,579	3,664	1,280	2,111	529	3,663	4,789	6,643	15,479	2,892	1,157	500	62,329
Mar.	46,552	12,026	34,526	4,336	1,306	1,848	342	2,966	4,484	5,052	8,949	2,550	1,135	500	67,994

(1) Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 115 tons in 1923, 1,117 in 1924, 3,618 in 1925, 3,263 in 1926, 2,439 in 1927, 1,437 in 1928, 2,670 in 1929, and 1,274 in 1930. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments were equivalent to 18 tons in 1923, 93 tons in 1924, 6 tons in 1925, 20 tons in 1926, about ½ ton in 1927, and 1 ton in 1928, and practically none in 1929, 1930 and 1931. (3) Official statistics. (4) Imports into Singapore and Penang. (5) Exports from "Other D.E.I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 2,342 tons in 1923, 1,008 tons in 1924, 2,239 tons in 1925, 44 tons in 1926, 84 tons in 1927, 1,459 tons in 1928, 1,302 tons in 1929, and 2,656 tons in 1930. (6) Calculated from official import statistics of principal consuming countries, viz., United States, United Kingdom, France, Germany, Belgium and Netherlands, and includes guayule rubber. (7) This total includes the third column for British Malaya, "Gross Exports minus Imports," and all the figures shown for the other territories. * Figure is provisional; final figure will be shown when available.

NOTE: THE FIGURES FOR 1933 ARE REVISED AS OF JANUARY 25, 1935 AND REPRESENT FINAL FIGURES

Net Imports of Crude Rubber into Principal Manufacturing Countries

(*Long Tons*)

	United States [1]	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (cd)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	World Total
1919	238,407	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	343,808
1920	249,530	56,844	13,885	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	371,409
1921	179,736	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,620
1922	296,594	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	—3,807	1,778	589	567	396,222
1923	301,527	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	409,173
1924	319,103	—11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	—807	3,178	944	1,370	416,203
1925	385,596	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	520,274
1926	399,981	84,865	34,240	22,775	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,299	1,870	617,957
1927	403,472	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,482	636	4,224	2,055	2,672	632,768
1928	407,572	4,846	36,498	37,855	30,447	25,621	12,433	15,134	8,430	7,958	2,243	4,418	3,178	3,138	599,771
1929	528,608	122,673	55,093	49,275	35,453	34,284	17,169	11,774	15,886	9,445	3,022	6,440	864	4,650	894,638
1930	458,036	120,069	68,503	45,488	28,793	33,039	18,639	16,387	5,354	10,635	2,924	7,710	2,400	4,468	822,445
1931	475,993	86,170	46,466	39,688	25,261	43,483	10,149	30,671	7,649	11,009	2,220	6,360	2,605	7,717	794,641
1932	393,844	44,086	42,506	45,121	20,917	56,027	14,469	30,637	12,576	9,519	2,851	7,262	4,359	9,444	693,618
1933	398,365	73,333	61,953	54,120	19,332	66,831	19,341	29,830	13,534	11,166	1,243	7,831	5,520	10,402	772,803
1934	439,172	158,482	49,560	59,330	28,439	69,905	21,398	47,271	9,642	9,115	3,758	12,418	6,900	10,999	926,389
1935	455,758	128,829	51,450	62,899	26,870	57,567	21,880		9,978	7,593	4,068	11,878	8,140	11,245	
1934:															
Aug.	31,403	13,728	3,660	3,078	1,948	4,945	1,795	6,839	658	669	239	1,033	277	1,495	71,759
Sept.	30,345	11,234	4,244	2,607	2,770	7,346	1,486	4,487	743	501	339	980	465	477	68,044
Oct.	27,323	18,897	3,424	2,148	3,043	7,227	1,296	3,681	798	693	447	813	675	254	70,719
Nov.	35,982	15,875	3,176	3,425	1,568	5,580	1,764	4,488	516	379	187	1,382	542	215	75,079
Dec.	17,305	15,816	3,605	5,207	2,849	3,904	1,979	6,460	1,312	—168	139	1,143	615	762	60,928
1935															
Jan.	39,546	20,383	5,573	4,286	2,670	4,400	1,613	3,446	1,099	419	158	1,252	468	1,245	86,558
Feb.	45,999	15,609	4,593	3,513	1,558	5,582	4,356	1,810	848	399	477	838	567	1,836	87,986
Mar.	44,772	12,810	4,017	6,353	2,710	4,421	1,582	4,624	1,459	240	331	891	630	741	85,581
Apr.	40,061	11,574	3,306	5,820	1,063	6,635	1,653	3,387	1,150	520	329	1,049	432	789	78,115
May	29,962	12,498	3,828	6,049	3,929	5,429	935	1,937	671	982	272	853	815	774	68,934
June	31,410	10,253	3,210	4,551	1,435	3,373	1,831	3,087	496	1,065	446	780	745	604	66,286
July	47,694	9,454	3,247	4,929	1,319	4,484	1,298	1,823	520	572	157	800	548	185	77,030
Aug.	41,057	14,120	4,508	4,790	2,814	4,453	916	1,227	655	528	413	820	752	673	77,726
Sept.	35,256	11,223	3,740	5,453	1,604	3,590	1,696	1,593	449	806	282	1,030	793	914	68,429
Oct.	35,770	3,184	5,175	6,074	812	4,727	2,500*	4,876	829	539	671	1,000	597	742	67,496
Nov.	25,756	2,942	4,731	6,258	4,389	4,361	2,000*	4,858	783	449	245	1,206	1,044	1,276	60,298
Dec.	38,072	4,779	5,522	4,823	2,567	6,112	2,500*		1,019	1,074	287	1,359	750	1,466	
1936:															
Jan.	33,260	4,573	6,755	5,545	1,759	4,355	2,500*	467	1,260	760	369	736	664	767	63,770
Feb.	33,789	1,271	6,264	5,257	1,900	2,786			735	799	106	497		344	
Mar.	33,743	—1,227	4,333								339				

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced 12 per cent in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1] United States imports of guayule are included in this compilation. * Figure is provisional; final figure will be shown immediately it becomes available.